THE ENGINEERING INDEX

1924

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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THE ENGINEERING INDEX

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1924

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PREFACE

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WHEN The American Society of Mechanical Engineers acquired THE ENGINEERING INDEX in 1918 it pledged itself to carry it on in the same spirit of service in which the work was first conceived over forty years ago, and which has always been its ideal. This volume, the sixth to be issued by the Society, has been prepared to furnish the profession with a convenient and satisfactory guide to the engineering literature of 1924.

In selecting the articles to be indexed in this volume, over 1300 periodicals, reports, and other publications received by the Engineering Societies Library during the year have been reviewed. Those who do not have direct access to these publications will find the photostatic service maintained by the Library and described on page xvi of great value.

In order to include foreign, irregular, and yearly publications of 1924 which were late in reaching the Library, all periodicals of that year received up to March 1, 1925, have been indexed in the present book. Many 1923 publications which came in too late for the last volume are also indexed. For current articles readers are directed to THE ENGINEERING INDEX section of the Society's monthly publication, *Mechanical Engineering*, in which nearly half of the items included herein appeared during 1924, and to a similarly entitled section of *The Engineering Journal*, the monthly publication of The Engineering Institute of Canada. The Engineering Index items dealing with foundry practice also appear in the quarterly *Bulletin* of The American Foundrymen's Association.

THE ENGINEERING INDEX

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* A reduction of one dollar will be allowed A.S.M.E. members on each of these three volumes. The group of three may be obtained at a reduced combination price of $17.00 ($14.00 to members), and the 1923 and 1924 volumes at a price of $12.50 ($10.50 to members).

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Kyoto Imperial University, College of Science. Memoirs—Kyoto, Japan—Irregular
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Lewis Institute. Structural Materials Research Laboratory. Bulletin—Chicago—Irregular
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National Industrial Conference Board. Research Reports—New York—Irregular
National Municipal Review—Concord, N. H.—Monthly
National Petroleum News—Cleveland, Ohio—Weekly
National Reclamation Magazine — Chicago — Monthly
National Research Council. Bulletin—Washington, D. C.—Irregular
National Safety News—Chicago—Monthly
Natural Gas—Cincinanti, Ohio—Monthly
Nature—London—Weekly
Nature—Paris—Weekly
Naturwissenchaftliche Umschau der Chemiker-Zeitung—Cöthen, Germany—Monthly
Nautical Gazette—New York—Weekly
Nebraska Blue Print—Lincoln, Neb.—Quarterly
Neftyanoe i Slanzevoe Khozyaystvo (Petroleum and Oil Shale Industry)—Moscow—Irregular
New England Railroad Club. Proceedings—Boston—8 nos. yearly
New England Water Works Association. Journal—Boston—Quarterly
New South Wales. Geological Survey—Sydney, Australia—Irregular
New York Railroad Club. Proceedings—New York—9 nos. yearly
New Zealand Journal of Science and Technology—Wellington, N. Z.—Bi-monthly
North Carolina. Geological Survey. Circulars and Bulletins—Raleigh, N. C.—Irregular
North-East Coast Institution of Engineers and Shipbuilders. Transactions—Newcastle-upon-Tyne, England—Irregular
North of England Institute of Mining and Mechanical Engineers. Transactions—Newcastle-upon-Tyne, England—Irregular
Norwegian Trade Review—Christiania—Bi-monthly
Note Tecniche di Aeronautica—Rome—Monthly
Nova Scotian Institute of Science. Proceedings and Transactions—Halifax—Irregular
Nuovo Cimento—Pisa, Italy—Irregular

Oesterreichische Monatischrift für den Oeffentlichen Baudienst—Vienna—Monthly
Oil Engine Power—New York—Monthly
Oil Engineering and Finance—London—Monthly
Oil News—Galesburg, Ill.—Monthly
Oil Trade Journal—New York—Monthly
Oil and Gas Journal—Tulsa, Okla.—Weekly
Onde Electrique—Paris—Monthly
Optical Society of America. Journal—Menasha, Wis.—Monthly
Organ für die Fortschritte des Eisenbahnwesens—Berlin—Monthly
Outillage—Paris—Monthly
Oxy-Acetylene Tips—New York—Monthly

Pacific Marine Review—San Francisco—Monthly
Pacific Railway Club. Proceedings—San Francisco—Monthly
Paint Manufacturers' Association of the U. S., Scientific Section. Circulars—Philadelphia—Irregular
Pan-American Union. Bulletin — Washington, D. C.—Monthly
Paper—New York—Weekly
Paper Mill and Wood Pulp News—New York—Weekly
Paper Trade Journal—New York—Weekly
Pennsylvania. Bureau of Topographic and Geological Survey. Bulletin—Harrisburg, Pa.—Irregular
Petroleum—Berlin—Tri-monthly
Petroleum Times—London—Weekly
Petroleum World—London—Monthly
Petroleum and Oil Shale Industry (Russian). See Neftyanoe i Slanzevoe Khozyaystvo
Physical Review—See American Physical Society
Physical Society of London. Proceedings—London—5 nos. yearly
Physikalische Zeitschrift — Leipsic, Germany—Semi-monthly
Pit and Quarry—Chicago—Semi-monthly
Plumbers' Trade Journal—New York—Semi-monthly

Port and Terminal—New York—Monthly
Ports and Waterways—Chicago—Monthly
Post Office Electrical Engineers Journal—See Institution of Post Office Electrical Engineers
Power—New York—Weekly
Power Engineer—London—Monthly
Power House—Toronto—Semi-monthly
Power Plant Engineering—Chicago—Semi-monthly
Power Wagon—Chicago—Monthly
Praktischer Maschinen-Konstrukteur — Berlin—Weekly
Proceedings—See names of Associations, Institutes, Institutions, Societies, etc.
Professional Engineer—Chicago—Monthly
Public Roads. See U. S. Dept. of Agriculture
Public Works—New York—Monthly
Purdue University. Engineering Departments Bulletin. Lafayette, Ind.—Irregular

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Quarry—London—Monthly
Queensland Government Mining Journal—Brisbane, Australia—Monthly

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Radio News—New York—Monthly
Radioélectricité—Paris—Semi-monthly
Railroad Red Book—Denver, Colo.—Monthly
Railroad Herald—Atlanta, Ga.—Monthly
Railway Age—New York—Weekly
Railway Board of India. See India. Railway Board
Railway Club of Pittsburgh. Proceedings—Pittsburgh, Pa.—9 nos. yearly
Railway Electrical Engineer—New York—Monthly
Railway Engineer—London—Monthly
Railway Engineering and Maintenance—Chicago—Monthly
Railway Gazette and Railway News—London—Weekly
Railway Journal—Chicago—Monthly
Railway Mechanical Engineer — New York—Monthly
Railway Review—Chicago—Weekly
Railway Signaling—Chicago—Monthly
Railway and Locomotive Engineering—New York—Monthly
Rassegna Mineraria, Metallurgica e Chimica—Rome—Monthly
Rauch und Staub—Düsseldorf, Germany—Monthly
Refrigerating Engineering. Journal of the American Society of Refrigerating Engineers—New York—Monthly
Refrigerating World—New York—Monthly
Refrigeration—Atlanta, Ga.—Monthly
Revista Brasileira de Engenharia—Rio de Janeiro—Monthly
Revista de Obras Públicas—Madrid—Semi-monthly
Revista del Colegio de Ingenieros de Venezuela—Caracas, Venezuela—Monthly
Revista Mexicana de Ingenieria y Arquitectura—Mexico, D. F.—Monthly
Revue Générale de l'Electricité—Paris—Weekly
Revue Générale des Chemins de Fer et des Tramways—Paris—Monthly
Revue Industrielle—Paris—Monthly
Revue Universelle des Mines—Liége, Belgium—Semi-monthly
Revue Universelle des Transports—Paris—Semi-monthly
Revue de l'Industrie Minérale—Paris—Semi-monthly
Revue de l'Ingenieur—Paris—Monthly
Revue de Métallurgie—Paris—Monthly
Revue des Materiaux de Construction et de Travaux Publics—Paris—Monthly
Rivista Marittima—Rome—Monthly
Rivista Tecnica delle Ferrovie Italiane—Rome—Monthly
Rock Products—Chicago—Bi-weekly
Rose Technic—Terre Haute, Ind.—Monthly
Royal Aeronautical Society Journal—London—Monthly
Royal Engineers' Journal—Chatham, England—Quarterly
Royal Institute of British Architects. Journal—London—20 nos. yearly
Royal Society. Proceedings, Section A, Mathematics and Physics—London—Irregular
Royal Society of Arts. Journal—London—Weekly
Royal Society of London. Philosophical Transactions—London—Irregular
Royal Society of Victoria. Proceedings—Melbourne—Irregular
Rubber Age—London—Monthly

Safety Engineering—New York—Monthly
St. Louis Railway Club. Proceedings—St. Louis, Mo.—Monthly
Salt Lake Mining Review—Salt Lake City, Utah—Semi-monthly
Schiffbau—Berlin—Weekly
Schweizerische Bauzeitung—Zurich, Switzerland—Weekly
Schweizerischer Elektrotechnischer Verein—See Association Suisse des Electriciens. Bulletin
Science—Lancaster, Pa.—Weekly
Science Abstracts—London—Monthly
Science and Art of Mining—Wigan, England—Biweekly
Scientific American—New York—Monthly
Scientific Monthly—Lancaster, Pa.—Monthly
Sheet Metal Worker—New York—Semi-monthly
Shipbuilder—London—Monthly
Shipbuilding and Shipping Record—London—Weekly
Sibley Journal of Engineering—Ithaca, N. Y.—9 nos. yearly
Siemens Zeitschrift—Berlin—Monthly
Smithsonian Institution—See U. S. National Museum
Sociedad de Fomento Fabril. Boletín—Santiago de Chile—Monthly
Sociedad Nacional de Mineria. Boletin Minero—Santiago de Chile—Monthly
Société Belge des Electriciens. Bulletin—Brussels—Monthly
Société Chimique de Belgique. Bulletin—Brussels—Monthly
Société Chimique de France. Bulletin—Paris—Monthly
Société d'Encouragement pour l'Industrie Nationale. Bulletin—Paris—10 nos. yearly
Société Française des Electriciens. Bulletin—Paris—Monthly
Société Géologique de Belgique. Annales—Liége, Belgium—Quarterly
Société Industrielle de l'Est. Bulletin—Nancy, France—Quarterly
Société Industrielle de Mulhouse. Bulletin—Mulhouse, France—Monthly
Société des Ingénieurs Civils de France. Mémoires et compte rendu des Travaux—Paris—Quarterly
Society for the Promotion of Engineering Education. Bulletin. See Engineering Education
Society of American Foresters. Journal of Forestry—St. Paul, Minn.—8 times yearly
Society of Automotive Engineers. Journal—New York—Monthly
Society of Chemical Industry. See Chemistry and Industry
Society of Glass Technology. Journal—Sheffield, England—Quarterly
Society of Industrial Engineers. Bulletin—Chicago—Monthly
Society of Naval Architects and Marine Engineers. Advance Papers—New York—Irregular
Society of Public Analysts and Other Analytical Chemists. Analyst—London—Monthly
South Africa Geological Society. Transactions—Johannesburg—Yearly
South African Engineering—London—Monthly
South African Institute of Electrical Engineers. Transactions—Johannesburg—Monthly

South African Institution of Engineers. Journal—Johannesburg—Monthly
South African Irrigation Department Magazine—Pretoria—Quarterly
South African Journal of Industries—Pretoria—Monthly
South African Mining and Engineering Journal—Johannesburg—Weekly
South African Power Engineer—Johannesburg—Monthly
South Wales Institute of Engineers. Proceedings—Cardiff, Wales—Irregular
Southern Engineer—Dalton, Ga.—Monthly
Southern and Southwestern Railway Club. Proceedings—Atlanta, Ga.—Bi-monthly
Sparwirtschaft—Vienna—Monthly
Sprechsaal—Coburg, Germany—Weekly
Städtereinigung—Berlin—Semi-monthly
Stahl und Eisen—Düsseldorf, Germany—Weekly
Steam Coal Buyer—St. Louis, Mo.—Monthly
Steam Power—Chicago—Monthly
Steamship—Leith, Scotland—Monthly
Stone—New York—Monthly
Stone and Webster Journal—Boston—Monthly
Strade—Milan, Italy—Monthly
Successful Methods—New York—Monthly
Sugar—New York—Monthly
Sulzer Technical Review—London—Quarterly
Surveyor—See Institution of Surveyors, New South Wales. The Surveyor
Surveyor and Municipal and County Engineer—London—Weekly
Surveyors' Institution. Journal—Westminster, England—Monthly
Swedish Export—Stockholm—Monthly

Tasmania Department of Mines, Geological Survey. Report—Hobart, Tasmania—Irregular
Taylor Society. Bulletin—New York—Bi-monthly
Tech Engineering News—Cambridge, Mass.—9 nos. yearly
Technik und Wirtschaft—Berlin—Monthly
Technique Automobile et Aérienne—Paris—Quarterly
Technique Moderne—Paris—Semi-Monthly
Technische Blätter—Essen, Germany—Weekly
Technograph—Urbana, Ill.—Quarterly
Technology Review—Boston—Monthly
Teknisk Tidskrift—Stockholm—Weekly
Teknisk Ukeblad—Christiania, Norway—Weekly
Tekniske Forenings Tidsskrift — Copenhagen — Monthly
Telegrafi e Telefoni—Rome—Bi-monthly
Telegraph and Telephone Age—New York—Semi-monthly
Telegraph and Telephone Journal — London — Monthly
Telegraphen- und Fernsprech-Technik—Berlin—Monthly
Telephone Engineer—Chicago—Monthly
Telephony—Chicago—Weekly
Tennessee. Geological Survey. Bulletin—Nashville, Tenn.—Irregular
Terrestrial Magnetism and Atmospheric Electricity—Cincinnati, Ohio—Quarterly.
Testing—New York—Monthly
Textile Institute. Journal—Manchester, England—Monthly
Textile World—Albany, N. Y.—Weekly
Times Trade and Engineering Supplement—London—Weekly
Tôhoku Imperial University. Science Reports; Technology Reports—Sendai, Japan—Irregular
Tokyo Imperial University. Journal—Monthly; Aeronautical Research Institute, Report—Irregular—Tokyo, Japan
Tonindustrie-Zeitung—Berlin—Semi-weekly
Toronto, University of. Engineering Society. Transactions—Toronto—Irregular
Trade Information Bulletin. See U. S. Dept. of Commerce
Tramway and Railway World—London—Weekly
Transactions—See names of Associations, Institutes, Institutions, Societies, etc.
Travelers' Standard—Hartford, Conn.—Monthly

United States Department of Agriculture Publications—Washington, D. C.
  Bulletins and Circulars—Irregular
  Public Roads—Monthly
  Weather Review—Monthly
United States Department of Commerce—Washington, D. C.—Irregular Publications
  Bureau of Census
    Census of Manufacturers
    Forest Products
  Bureau of Standards
    Bulletins and Circulars
    Scientific Papers
    Technologic Papers
  Coast and Geodetic Survey
  Commerce Reports
    Bulletins
    Trade Information Circulars
United States Department of the Interior—Irregular Publications—Washington, D. C.
  Bureau of Mines
    Bulletin
    Reports of Investigations
    Technologic Papers
  Geological Survey
United State Department of Labor. Bureau of Labor Statistics—Washington, D. C.
  Bulletins—Irregular
  Labor Review—Monthly
United States Geological Survey—Washington, D. C.—Irregular
United States National Advisory Committee for Aeronautics. Reports; Technical Notes—Washington, D. C.—Irregular
United States National Museum. Smithsonian Institution—Washington, D. C.—Irregular
United States Naval Institute. Proceedings—Annapolis, Md.—Monthly
United States Public Health Service—Washington, D. C.—Irregular
United States War Department Publications—Washington, D. C.
  Air Service Information Circular—Irreg.
  Military Engineer—Bi-monthly
Universal Engineer—New York—Monthly
Universities. See under name of States, as Illinois, University of
Usine—Paris—Weekly

Verein der Deutschen Zucker-Industrie. See Zeitschrift des Vereins der deutschen Zucker-Industrie
V. D. I. Zeitschrift. See Zeitschrift des Vereines deutscher Ingenieure
Verkehrstechnik—Berlin—Weekly
Vie Technique et Industrielle—Paris—Monthly
Virginia Geological Survey—Richmond, Va.—Irregular

Wärme—Berlin—Weekly
Wärme- u. Kälte-Technik—Erfurt, Germany—Semi-monthly
Washington Academy of Sciences. Journal—Baltimore, Md.—Semi-monthly
Waterstaats Ingenieur—Surabaya, Java—Monthly
Welding Engineer—Chicago—Monthly
Werkstattstechnik—Berlin—Semi-monthly
West of Scotland Iron and Steel Institute. Journal—Glasgow, Scotland—Irregular
Western Machinery World—San Francisco—Monthly
Western Society of Engineers. Journal—Chicago—Monthly
Wireless World and Radio Review—London—Weekly

Wirtschafts-Motor. Nutz-Motor—Berlin—Monthly
Wisconsin Engineer—Madison, Wis.—8 nos. yearly
Wisconsin, University of. Bulletin—Madison—Irregular
Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt—Berlin—Irregular
Wood Preserving News—Chicago—Monthly
Wood-Worker—Indianapolis, Ind.—Monthly
Worcester Polytechnic Institute. Journal—Worcester, Mass.—9 nos. yearly
World Ports—New Orleans, La.—Monthly
World Power—London—Monthly

Zeitschrift des Bayerischen Revisions-Vereins—Munich, Germany—Semi-monthly
Zeitschrift des Mitteleuropäischen Motorwagen-Vereins. See Automobile-Rundschau
Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines—Vienna—Weekly
Zeitschrift des Vereines deutscher Ingenieure—Berlin—Weekly
Zeitschrift des Vereins der deutschen Zucker-Industrie—Berlin—Bi-monthly
Zeitschrift des Vereins zur Beförderung des Gewerbefleisses. See Gewerbefleiss.
Zeitschrift für angewandte Chemie—Leipsic, Germany—Weekly
Zeitschrift für angewandte Mathematik u. Mechanik—Berlin—Bi-monthly
Zeitschrift für anorganische und allgemeine Chemie—Leipsic, Germany—Irregular
Zeitschrift für Bauwesen—Berlin—Quarterly
Zeitschrift für Elektrochemie—Leipsic, Germany—Monthly
Zeitschrift für Fernmeldetechnik, Werk- und Gerätebau—Munich, Germany—Monthly
Zeitschrift für Flugtechnik und Motorluftschiffahrt—Munich, Germany—Semi-monthly
Zeitschrift für Hochfrequenztechnik—Berlin—Monthly
Zeitschrift für Instrumentenkunde—Berlin—Monthly
Zeitschrift für komprimierte und flüssige Gase—Weimar, Germany—Monthly
Zeitschrift für Metallkunde—Berlin—Monthly
Zeitschrift für Physik—Braunschweig, Germany—Irregular
Zeitschrift für physikalische Chemie—Leipsic, Germany—Irregular
Zeitschrift für Sauerstoff- und Stickstoff-Industrie Leipsic, Germany—Monthly
Zeitschrift für technische Physik—Leipsic, Germany—Monthly
Zeitschrift für das Berg-, Hütten- und Salinenwesen—Berlin—Irregular
Zeitschrift für das gesamte Schiess- und Sprengstoffwesen—Munich—Monthly
Zeitschrift für die gesamte Giessereipraxis—Eisen-Zeitung—Berlin—Weekly
Zeitschrift für die keramischen Glas- und verwandten Industrien. See Spreschsaal
Zentralblatt der Bauverwaltung—Berlin—Weekly
Zpravy Verejne Sluzby Technicke (Association of Technical Service, Proceedings)—Prague—Bi-monthly

CONVENTIONS USED IN INDEXING

Abbreviations

In addition to the commonly accepted abbreviations, the following have also been employed in this volume of THE ENGINEERING INDEX:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical, Chemistry (Chem.)
Electrical, Electric (Elec.)
Electrician (Elecn.)
Engineer [s] Engr.[s]
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Management (Mgmt.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Public (Pub.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Schweizerische (Schweiz.)
Scientific or Science (Sci.)
Society (Soc.)
State Names (Ill., Pa., etc.)
Supplement (Supp.)
Transactions (Trans.)
Ventilating (Vent.)
World (Wld.)
Zeitschrift (Zeit.)

Cross-References

Main headings of the INDEX are printed in bold-face capital letters; sub-headings in bold-face small letters. Cross-references printed in capital letters indicate main headings; those in small letters indicate sub-headings. Whenever a cross-reference is given in small letters only, it refers to a sub-heading under the same main heading as the cross-reference itself.

Cross-references enclosed in brackets apply to the main heading under which they appear, not to the item or group of items immediately following.

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When ordering prints, identify the article by quoting from the Index item the following:

1 Title of article

2. Name of periodical in which it appeared

3 Volume, number, and date of publication of periodical

4 Page numbers.

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THE ENGINEERING INDEX

1924

A

ABBREVIATIONS

Engineering, French. New French Abbreviations (Désignations abrégées à adopter pour l'unité de puissance). Revue de l'Industrie Minérale, no. 80, Apr. 15, 1924, p. 193. Number of leading engineering societies and periodicals in France have decided to adopt abbreviation "ch" for unit horsepower and "ch h" for unit horsepower-hour; these abbreviations are likely to be used generally in French technical literature.

ABRASIVE WHEELS

Balance. Grinding Wheel Balance, H. Darbyshire. Eng. Production, vol. 7, no. 146, Nov. 1924, pp. 319-324, 6 figs. Notes on dynamic balance; balancing a wheel; internal grinding wheels; balanced wheels for surface grinding; grinding copper; difficulty of grinding tubing; wheel crumbling; sizing devices; etc.

Manufacture. Grinding Wheels, H. Bentley. Mech. Wld., vol. 76, nos. 1958 and 1960, July 11 and 25, 1924, pp. 18-19 and 51-53, 3 figs. Discusses properties of abrasives, bonds, mounting, and protection of wheels and applications.

Making Vitrified Abrasive Wheels. Chem. & Met. Eng., vol. 31, no. 14, Oct. 6, 1924, pp. 531-533, 6 figs. Problems in production of abrasive wheels from carborundum grains.

Surface Grinding in Stone Work (Der Flächenschliff in der Gesteinsbearbeitung), C. Krug. Tonindustrie-Zeitung, vol. 48, no. 73, Sept. 10, 1924, pp. 791-795, 14 figs. Series of articles on grinding wheels, grain and hardness, production, evaluation of abrasives, grinding in grinding machines, safety regulations, roller grinding machines, natural and artificial abrasives, etc.

The Manufacture of Rubber-bond Grinding Wheels, E. Sheldon. Am. Mach., vol. 60, no. 21, May 22, 1924, pp. 777-780, 17 figs. Vulcanizing the wheels; static test to determine breaking strength; methods of dressing wheels; running test; wheels for various purposes.

Polishing. Preparing Wheels for Polishing, F. D. Bowman, Iron Trade Rev., vol. 74, no. 12, Mar. 20, 1924, pp. 796-797, 3 figs. Various grades should be used depending upon finish desired on work; properties and preparation of glue, application of abrasive, setting, temperature and storage are factors in wheel effectiveness.

Salvage Methods. Outline Wheel Salvage Methods, F. W. Brown. Abrasive Industry, vol. 5, no. 12, Dec. 1924, pp. 293-294, 3 figs. Wheels that heretofore went to scrap pile are reclaimed and put back in stock at plant of Continental Motors Corpn., Muskegon, Mich.; expensive equipment not necessary.

Selection and Uses. Grinding for Quick Repetition, W. Wilson. Commonwealth Engr., vol 11, nos. 4 and 5, Nov. 1 and Dec. 1, 1923, pp. 148-150 and 183-185, 4 figs. Discusses grinding wheels, including rating, selection for work, lubrication, speeds, mounting, and uses; drill grinding.

Truing, Diamonds for. See DIAMONDS, Industrial.

ABRASIVES

Carborundum. See CARBORUNDUM.

Emery. See EMERY.

Papers and Cloths. Finishing with Abrasive Paper, John M. Cook. Iron Trade Rev., vol. 74, no. 9, Feb. 28, 1924, pp. 613-615, 13 figs. Methods employed in making abrasive paper and cloth.

Pumice. See PUMICE.

Statistics. Abrasive Materials in 1922, L. M. Beach and A. T. Coons. U. S. Geol. Surv., no. II:25, Dec. 3, 1923, pp. 221-225. Statistics on natural and artificial abrasives, covering production, consumption, imports and exports, of United States.

Tripoli. See TRIPOLI.

ABUTMENTS

Concrete Bridge. Novel Abutment Effects Economy in Concrete Bridge, A. G. Hayden. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 26-27, 3 figs. Novel type abutment of Park Avenue bridge over Bronx River Parkway Reservation near Tuckahoe, N. Y. Horizontal thrust taken by wing walls; vertical thrust distributed through abutments acting as vertical beam.

Masonry Arched Bridges. Design of Abutments for Masonry Arched Bridges, K. D. Joshi. Mysore Engrs.' Assn.—Bul., vol. 1, no. 1, July-Sept. 1923, pp. 109-117, 3 figs. Discusses design of abutments, making calculations.

Movements of Elasticity in. The Movements of Abutments in Statically Indeterminate Supporting Structures. (Widerlagerbewegungen bei statisch unbestimmten Tragwerken), A. Troche. Beton u. Eisen, vol. 23, no. 8, Apr. 20, 1924, pp. 97-99, 5 figs. Describes simple and readily comprehended formulation of equations of elasticity in abutment movements.

Niagara Gorge Bridge. Michigan Central Niagara Bridge Abutments Completed. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, pp. 398-399, 3 figs. Excavation and concreting of abut-

ments and piers on American side of Niagara Gorge done in six months.

ACCELEROMETERS

Automobile Acceleration, Measurement. New Quantitative Method of Measuring the Riding Comfort of Automobiles, F. H. Norton. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 136-138, 3 figs. Discusses acelerations acting on passenger, and design of accelerometer; accuracy of readings; factors to be considered in further study.

Impact Tests on Roads. Accurate Accelerometers Developed by the Bureau of Public Roads, L. W. Teller. Pub. Roads, vol. 5, no. 10, Dec. 1924, pp. 1-7, 15 figs. Results of calibrations of three types of accelerometers, beam, coil-spring and sylphon types, characteristics of which are described; coil-spring type was shown to be best for impact studies.

Recording Linear Accelerations. A New Instrument for Recording Linear Accelerations, F. H. Norton. Franklin Inst.—Jl., vol. 198, no. 2, Aug. 1924, pp. 231-242, 7 figs. Describes how problems involved in design of accelerometer were solved.

ACCIDENT PREVENTION

Acetylene, Use of. See ACETYLENE, Accident Prevention in Use of.

Industrial. Prevention of Accidents. Maschinenbau, vol. 3, no. 22, Aug. 28, 1924. Contains following articles: Accident Prevention on Presses, W. leVrang, pp. 795-799; Accident Prevention on Eccentric Presses, R. Wittlinger, pp. 799-801, 7 figs.; Safety of Protective Screens, G. Weber, pp. 801-802; Accident Prevention in Wood Industry, W. Wiedemann, pp. 802-804, 5 figs.; Welding of Iron Containers of Flammable Liquids, M. Fischer, pp. 804-806, 1 fig.; Organization Work of Machinery Industry for Accident Prevention, J. Free, pp. 819-821, 3 figs.; Progress in Accident Prevention in Machine Shops, J. Bleick, pp. 822-823; Activity of Technical Committee in Breslau, M. Schindler, pp. 823-826; and Accident Prevention and Labor, H. Gottschalk, pp. 826-829. (In German).

ACCIDENTS

Boiler. See BOILERS, Accidents.

Coal Mines. See COAL MINES, Accidents.

Electric Currents. Accidents in High Tension Installations in Switzerland in 1923 (Unfälle an Starkstromanlagen in der Schweiz im Jahre 1923). Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 4, Apr. 1924, pp. 149-157. Tabular list of such accidents (excluding electric-railway installations); description of typical accident and discussion of causes.

Explosions. See EXPLOSIONS.

Eye Injuries. Nature and Cause of Eye Injuries, L. H. Carris and L. Resnick. Safety Eng., vol. 47, no. 3, Mar. 1924, pp. 121-123. Analysis of causes and nature of injuries.

Penetrating Injuries to the Eye in Industrial Occupations, F. Allport. Safety Eng., vol. 47, nos. 1 and 2, Jan. and Feb. 1924, pp. 5-7 and 74-76. Methods of removing foreign bodies from eye; glass most difficult; iron and steel may be drawn with a magnet; choice of magnets. Reprinted from Ill. Medical Jl., Oct. 1923.

Highway-Traffic. See HIGHWAYS, Traffic Accidents.

Industrial. Accident Frequency and Personal Idiosyncrasies (Unfallhäufigkeit und persönliche Eigenschaften), K. A. Tramm. Werkstattstechnik, vol. 18, no. 15, Aug. 1, 1924, pp. 395-398, 5 figs. Shows from statistics that 48 per cent of accidents are due to defective rules, 14.5 per cent to labor, 37.5 per cent to human elements like carelessness, disease, etc., left to right side accidents are 46.5 to 34, etc.

Industrial Accidents and Hygiene. Monthly Labor Rev., vol. 18, no. 1, Jan. 1924, pp. 142-156. Conference on industrial accident rates called by U. S. Dept. of Labor; record of industrial accidents in United States for 1922; coke-oven accidents during 1922; accidents on steam railroads; decline in tuberculosis death rate; health conditions among chemical workers with respect to earnings.

Industrial Accidents and Hygiene. Monthly Labor Rev., vol. 19, no. 6, Dec. 1924, pp. 124-140. Carbon tetrachloride as cure for hookworm disease; report of committee on industrial morbidity statistics; lead poisoning caused by sandpapering automobile bodies; mine-accident statistics; critical time of day for coal-mine explosions; mine fatalities due to explosives in 1923; industrial eye accidents in New York State, 1922-23; coal-mine accidents.

Locomotive. Chief Locomotive Inspector's Annual Report, A. G. Pack. Ry. Jl., vol. 30, nos. 1 and 2, Jan. and Feb. 1924, pp. 36-39 and 31-33. Twelfth annual report of Chief Inspector covering work of Bur. Locomotive Inspection during fiscal year ended June 30, 1923. Results of investigation of accidents due to failure of parts and appurtenances of locomotive and tender, including boiler. See also Boiler Maker, vol. 24, no. 1, Jan. 1924, pp. 7-10, 9 figs., and Ry. Age, vol. 76, no. 4, Jan. 26, 1924, pp. 285-288, 11 figs.

Materials Handling. See MATERIALS HANDLING, Accidents.

Metallurgical Works. See METALLURGICAL WORKS, Accidents.

Mines and Quarries. Mines and Quarries in 1923. Iron & Coal Trades Rev., vol. 119, no. 2959, Nov. 14, 1924, pp. 777-778. Storage-battery locomotives in mines; accidents. (Abstract.) Annual report of Chief Inspector of Mines (Britain).

The Cost of Accidents in Metal Mines as Measured by Compensation Insurance Premiums, B. O. Pickard. U. S. Bur. Mines—Reports of Investigations, no. 2625, July 1924, 9 pp. Estimate of cost of compensation insurance as affecting underground metal-mine operators.

See also MINES, Accident Statistics; Haulage Accidents; Metal, Accidents in.

Shipyard. See SHIPYARDS, Accidents in.

ACCOUNTING

Cost. See COST ACCOUNTING.

Public-Utility. Unit Plan of Accounting for Public Utilities, H. J. Johnson. Am. Gas Assn. Monthly, vol. 6, no. 3, Mar. 1924, pp. 147-153, 9 figs. Describes system which is a modification of plan known as "bookkeeping without books"; is exceedingly rapid in its operation as well as 100 per cent complete and is designed to meet most exacting requirements.

Railway. See RAILWAY MANAGEMENT, Accounting.

Systems, Installation of. Some Problems in the Installation of Accounting Systems, Wm. A. Ullrich. Jl. Accountancy, vol. 37, no. 3, Mar. 1924, pp. 193-201. Discusses problems showing how ingenuity of accountant is taxed to find new ways to solve difficulties which present themselves.

Tabulating Machines. See TABULATING MACHINES.

ACCUMULATORS

Electric. See STORAGE BATTERIES.

Hydraulic. See HYDRAULIC ACCUMULATORS.

Steam. See STEAM ACCUMULATORS.

ACETONE

Action on Metals. See METALS, Acetone and Methanol, Action of.

ACETYLENE

[See also CALCIUM CARBIDE.]

Accident Prevention in Use of. Prevention of Accidents in Using Acetylene (Verhütung von Unfällen bei Verwendung von Acetylen), M. Rimarski. Zeit. für angewandte Chemie, vol. 37, no. 32, Aug. 7, 1924, pp. 589-593, 6 figs. Details of new regulations to eliminate accidents, explosions, etc., in view of increasing use of acetylene, re-examination of materials for containers, examination of flasks five years in service, etc.

Benzol from. See BENZOL, Production from Acetylene.

Compressed - Dissolved. Compressed - Dissolved Acetylene, M. A. Dantzler. Am. Welding Soc.—Jl., vol. 3, no. 5, May 1924, pp. 30-33. Discusses acetylene gas which has been compressed and dissolved into specially designed portable cylinders, which may be "tapped" at convenience of consumer at varying distances from source of manufacture.

Hazards. Work of Chemico-Technical Reichsanstalt on Acetylene, Especially Questions of Danger (Mitteilungen über die Arbeiten der Chemisch-Technischen Reichsanstalt auf dem Gebiete des Acetylens), Rimarski. Autogene Metallbearbeitung, vol. 17, nos. 19, 20, and 21, Oct. 1, 15, and Nov. 1, 1924, pp. 245-258, 261-268, and 283-287. Deals with filling of acetylene flasks, police regulations, safety in transportation, examination of porous substances, acetone and substitutes, ignition tests; back-firing of flame, automotive safety measures, etc.

Production, Carbide Residue Utilization. Utilization of Carbide Residue, J. J. Murphy. Acetylene Jl., vol. 26, no. 6, Dec. 1924, pp. 278-280. Results of tests. Estimated value of residue at various acetylene plants throughout United States, $1,750,000. Residue valuable in mortar and plaster industry, and for manufacture of brick, paper, pulp, etc.

Regulations, German. New Acetylene Regulations for Greater Berlin (Die neue Azetylenverordnung für Gross-Berlin zur Bekämpfung der Gefahren des Azetylens), V. Wendt. Gesundheits-Ingenieur, vol. 47, no. 42, Oct. 18, 1924, pp. 494-495. Regulations covering acetylene gas for illuminating, toxicity of acetylene, calcium carbide storage, etc.

ACIDS

Displacement by Diffusion. Displacement of Acids by Diffusion (Sur le déplacement des acides par diffusion), E. Demoussy. Académie des Sciences—Comptes Rendus, vol. 178, no. 2, Jan. 7, 1924, pp. 208-211. Displacement of strong acid (hydrochloric) by weaker one (formic) in presence of membrane is shown to be due to greater speed of diffusion of stronger acid, and to take place in absence of membrane.

ACOUSTICS

Architectural Interiors. The Acoustic Design of Architectural Interiors, V. O. Knudsen. Eng. & Contracting (Buildings), vol. 62, no. 6, Dec. 24, 1924, pp. 1371-1378, 3 figs. Principles involved and methods of assuring good acoustics. From Architect & Engr., Oct. 1924.

Auditoriums. Acoustics in Auditorium Design, P. E. Sabine. Am. Architect, vol. 125, no. 2448, June 18, 1924, pp. 579-586, 7 figs. Study of acoustical difficulties which may be classed under two general heads: those arising from concentration of sound reflected from extended concave surfaces and those arising from excessive reverberation.

Acoustics of Auditoriums, F. R. Watson. Franklin Inst.—Jl., vol. 199, no. 1, July 1924, pp. 73-83, 2 figs. Discusses mathematical equations for loudness of voice and tune of reverberation deduced from tabulations of acoustic data of auditoriums pronounced good by public opinion.

Ear. The Works of Fletcher, Wegel and Lane on the Acoustics of the Ear (Les travaux de MM. Fletcher, Wegel et Lane sur l'acoustique de l'oreille), Reynaud-Bonin. Annales des Postes Télégraphes & Téléphones, vol. 13, no. 1, Jan. 1924, pp. 26-36, 5 figs. Discusses works of investigators stationed at Research Laboratory of West. Elec. Co., who arrived at conclusion that total number of simple sounds that human ear is capable of distinguishing from one another is about 300,000.

Planning for Regulation. Planning for Good Acoustics, H. Bagenal. Roy. Inst. Brit. Architects—Jl., vol. 32, no. 2, Nov. 22, 1924, pp. 29-43, 4 figs. Lessons learned from Greek open-air theaters; use of resonators in Greek theater; churches; concert rooms; behavior of ceilings; modern parliament chambers; absorbing materials and their requirements.

Resonators. On the Determination of the Frequencies of the Resonant Tones of Some Compound Resonators used in Acoustical Instruments, E. T. Paris. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl., Sci., vol. 48, no. 287, Nov. 1924, pp. 769-799, 9 figs. Theoretical expressions are obtained by means of which resonance frequencies of several types of compound resonator employed in acoustical instruments can be calculated by use of graphical methods; experiments are described which show satisfactory agreement with theoretical results.

Sounding Devices. See AIR, Pressure and Velocity.

ADSORPTION

Electric Theory. Electric Nature of Forces of Adsorption (Ueber die elektrische Natur der Adsorptionskräfte), W. Tarassoff. Physikalische Zeit., vol. 25, no. 15, Aug. 1, 1924, pp. 369-374. Discusses dependence between heat of adsorption and dielectric constant of substance to be adsorbed, showing electric nature of adsorption.

Large Surface Areas. Adsorption of Large Surface Area (Beiträge zur Natur der Adsorption von grossoberflächigen Stoffen), E. Berl and E. Wachendorff. Zeit. für angewandte Chemie, vol. 37, no. 39, Sept. 25, 1924, pp. 747-750, 4 figs. Adsorption isothermals at 20 deg. for various charcoals and sample of active silica were determined by means of an arrangement in which benzol vapor, mixed with air, was led through constant thickness of adsorbent.

Theory. Modern Theory of Adsorption and Its Significance in Petroleum Technology (Die moderne Adsorptionslehre in ihrer Bedeutung für die Chemie und Technologie des Erdöls), M. A. Rakusin, Petroleum, vol. 20, nos. 31 and 32, Nov. 1 and 10, 1924, pp. 1695-1699 and 1761-1766. Reviews theory of adsorption of gases, vapors and liquids by porous substances; adsorption in petroleum solutions in laboratory and factory practice; adsorption of oil vapors; relation between adsorption and chemical reaction; adsorption and catalysis.

Theory of Adsorption and Related Phenomena (Theorie der Adsorption und verwandter Erscheinungen), J. Frenkel. Zeit. für Physik, vol. 26, no. 2, Aug. 8, 1924, pp. 117-138. When gas atoms or molecules of gas stream impinge on surface of a solid, they are in no way reflected but condense, and after certain time, they re-evaporate; author gives results to which quantitative development of this idea leads.

AERIAL NAVIGATION. See AIRSHIPS, Navigation; AVIATION.

AERIAL PHOTOGRAPHY

"Lean" in Photographs. Correcting the "Lean" in Aerial Photographs, E. H. Corlett. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 352-353, 2 figs. Mathematical explanation of how to obtain a true instrumental orientation when using air photos as plane-table sheets or for other field purposes.

Mapping, Use in. See Topographic Mapping; MAPPING, Aerial Photography in.

Surveying, Use in. See SURVEYING, Aerial.

Surveys. Some Features in the Present Position of Aerial Photographic Survey. Roy. Aeronautical Soc.—Jl., vol. 28, no. 163, July 1924, pp. 475-500, 7 figs. Discusses working out of methods for aerial survey on basis of vertical and oblique photographs; and scientific and economic information to be gained from photos.

Topographic Mapping. Topography from Aerial Photographs, H. C. Fiske. Military Engr., vol. 16, no. 89, Sept.-Oct. 1924, pp. 399-408, 13 figs. It is claimed that airplane, camera and stereoscope have made possible standard for mapping important details of topography which, from user's viewpoint, has never before been attained.

AERIAL TRAMWAYS. See CABLEWAYS.

AERIAL TRANSPORTATION. See AVIATION, Aerial Transportation.

AERODYNAMICS

Lilienthal Effect. The Lilienthal Effect and Some Writings of Lilienthal (Bemerkungen zu zwei neueren Schriften von G. Lilienthal), J. Ackeret. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 21-22, Nov. 28, 1924, pp. 242-244, 3 figs. Discusses some startling effects which are partially cleared up, such as so-called "stroke effect," and the ram's horn vortex, by which is meant that air may form vortices under hollow wings, these vortices having tendency to move toward tips. See also article by R. Fick, entitled, The Lilienthal Effect and Dynamic Soaring (Lilienthaleffekt und dynamisches Segeln), nos. 21-22 and 23, Nov. 28 and Dec. 31,, 1924, pp. 244-246 and 258-260, 9 figs. Discusses Knoller-Betz effect and the Lilienthal effect proper.

Magnus Effect. The Magnus Effect (Der Magnus-Effekt), P. Heyn. Schiffbau, vol. 25, no. 28, Nov. 19, 1924, pp. 803-806, 4 figs. Discusses principle of action of wind on a rotating cylinder, as used in Flettner rotor ship, to explain deviation of a cannon ball from straight course.

Photographic Measurements in. Photographic Measurements in Aerodynamics, R. Katzmayr. Aviation, vol. 17, no. 22, Dec. 1, 1924, pp. 1334-1337, 8 figs. Method of photographic measurement, according to which every photograph represents projection of photographed object on plate, and each point on image corresponds to point on object; example of use of photographic measurement in determining propeller profile; reproducing lines of air flow; photographing wing deformations; further uses of test; analyzing flight path. Translated from German.

Resistance of Bodies to Air. Law of Variation of Coefficient of Resistance to Air of Some Bodies (Sur la loi de variation du coefficient de résistance de l'air pour quelques corps), L. Marchis. Bul. Technique du Bureau Veritas, vol. 6, no. 6, June 1924, pp. 109-114, 6 figs. Reynolds number in aerodynamics; geometric form of bodies; resistance of cylinders, spheres, ellipsoids, circular disks, and other bodies.

Rotating Cylinders, Tests of. Tests of Rotating Cylinders, E. G. Reid, U. S. Nat. Advisory Com. for Aeronautics—Tech. Notes, no. 209, Dec. 1924, 17 pp., 17 figs. on supp. plates. Tests made in No. 1 (5 ft. atmospheric) wind tunnel at Langley Memorial Aeronautical Laboratory to determine air forces acting on rotating cylinders with axes perpendicular to direction of motion.

Water Channels for Research. The Case for the Revival of the Water Channel, N. S. Norway. Roy. Aeronautical Soc.—Jl., vol. 28, no. 167, Nov. 1924, pp. 647-652. Discusses ways in which improvement in design of airplanes may be effected; in author's belief, water channel is most suitable means of carrying out study of flow about machine.

AERONAUTICAL INSTRUMENTS

Airship. See AIRSHIPS, Instruments.

Compasses. See COMPASSES, Aircraft.

Developments. Some Recent Developments in Aircraft Instruments, H. E. Wimperis. Roy. Aeronautical Soc.—Jl., vol. 28, no. 157, Jan. 1924, pp. 3-29 and (discussion) 29-34, 15 figs. Appendix, with illustrations, no. 158, Feb. 1924, pp. 45-48, 5 figs. Discusses instruments for D. R. navigation and astronomical navigation, method of reducing sextant observations, determination of height, magnetic compass, etc.

Radiogoniometers. See DIRECTION FINDING.

Rate-of-Climb Recorders. Optical Rate-of-Climb Recorders—Their Uses, Theory, and Description, A. H. Mears and D. H. Strother. Optical Soc. of Am.—Jl., vol. 8, no. 6, June 1924, pp. 787-801, 7 figs. Describes instruments developed by staff of Bur. Standards at request and with financial assistance of Air Service, U. S. Army, and Bur. Aeronautics, U. S. Navy.

Wind Measurement. Objective Wind Measurement in Aircraft (Ueber objektive Windmessung im Luftfahrzeuge), H. Boykow. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 5-6, Mar. 26, 1924, pp. 40-42, 4 figs. Describes instrument, constructed by Goerz Works for airship oversea flight to America and for the Amundsen transpolar flight, which measures simultaneously luff angle and speed above ground.

AERONAUTICS

Developments. Aeronautics in 1923. Engineer, vol. 137, nos. 3549 and 3550, Jan. 4 and 11, 1924, pp. 22-24, and 36-38 and 44, 19 figs., partly on supp. plate. Civil aviation; light airplanes; military aeronautics; helicopters; airships; typical British airplanes.

The 13th Annual Meeting of the German Scientific Aeronautical Society [Bericht über den Verlauf der XIII. Ordentlichen Mitglieder-Versammlung der Wissenschaftlichen Gesellschaft für Luftfahrt (WGL)], G. Krupp. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 19, Oct. 14, 1924, pp. 198-201. Review of papers dealing with modern developments in airplane construction, especially with reference to design of very large planes; results of experiments at Aerodynamical Research Laboratories at Goettingen for study of mutual influence of propeller and plane, and investigations of Magnus effect; review of military-airplane developments the world over; protection of passengers in case of breakage; development of radiator; light airplanes; middle-weight machines; etc.

Flow, Theory of. Session on Flying of the VDI General Meeting (Tagung über Luftfahrt gelegentlich der Hauptversammlung des VDI, Hannover). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 36, Sept. 6, 1924, pp. 926-928, 6 figs. Series of papers discussing progress in theory of flow and calculations of flow round asymmetric bodies; wing forms; theory of airfoils or theory of circulation; light-weight construction.

Hydrodynamics, Application of. The Simplifying Assumptions, Reducing the Strict Application of Classical Hydrodynamics to Practical Aeronautical Computations, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes. no.

207, Nov. 1924, 16 pp. Deals with theory of lateral air forces on airship hulls, theory of wing sections in two-dimensional flow, theory of wings with finite span, and propeller theory.

Naval. Development in Naval Aeronautics, H. C. Richardson. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 412-417, 18 figs. Principal developments along lines of HS, H-16 and F-5-L types of airplane, used during war for convoy work, submarine patrol, and scouting, are represented by present types PN-7, equipped with Wright T-2 engines, and PN-8, having Wright T-3 engines, metal hull and metal tail surfaces; their construction and performance; discusses metal floats for airplanes; characteristics and performance of "training," scouting and other types of airplane; launching seaplanes from catapult; notes on aircraft engine, propeller, seagoing aircraft carriers, and lighter-than-air craft, etc.

Paris Show. The Ninth Aeronautic Show, Dec. 5-21, 1924 (Le Neuvième Salon de l'Aéronautique, 5-21 decembre 1924). Aéronautique, vol. 6, no. 67, Dec. 1924, pp. 273-328, 60 figs. A series of articles covering industrial conditions of aeronautic production, quantity production of metal airplanes, and industrial production of airplanes, followed by description of the different exhibits.

Ship Design, Application in. See SHIP DESIGN, Aeronautics Applied to.

AGRICULTURAL MACHINERY. See FARM MACHINERY.

AGRICULTURE

Farm Equipment, Research in. Agricultural Engineering Research in Farm Field Equipment, M. L. Nichols. Agricultural Eng., vol. 5, no. 2, Feb. 1924, pp. 35-38. Brief analysis of general subject of tillage for purpose of bringing to light some of more important investigational features involved in development and improvement of tillage methods and equipment. Bibliography.

AIR

Cleaning. See Dustiness Measurement; AIR CONDITIONING, Air Cleaners.

Compressed. See COMPRESSED AIR.

Conditioning. See AIR CONDITIONING.

Cooling. See AIR CONDITIONING, Cooling and; AIR COOLING.

Cooling Effect on Human Beings. See HEALTH, Physiological Reactions to Air Cooling.

Drying. See AIR CONDITIONING, Drying.

Dustiness Measurement. The Production and Measurement of Air Dustiness, M. Ingels. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 135-152, 15 figs. Describes dust liberator, an apparatus developed for adding dust to room air, for testing purposes; tests with Anderson and Armspach dust determinator for measuring efficiency of air-cleaning equipment; gives dust chart and explains its use; sampling moving air.

Dusts and Smokes Determination. The Use of Owens' Jet Dust Counter and of Electric Precipitation in the Determination of Dusts, Fumes, and Smokes in Air, P. Drinker and R. M. Thompson. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30. no. 11, Nov. 1924, pp. 695-710, 14 figs. Classification of dusts, fumes, and smokes is suggested and is based on size of particles and methods by which they are liberated into air. Describes Owens jet dust counter, and discusses its usefulness in general dust problems. Discusses electric precipitation in its theoretical and practical aspects as applied to small precipitators for determination of dusts, fumes, and smokes in air. Describes method of mounting transparent celluloid foils on which particles have been precipitated.

Filters. See AIR FILTERS.

Flow of. See FLOW OF AIR.

Heaters for. See AIR HEATERS.

Liquid. See LIQUID AIR.

Meters, Compressed-Air. See COMPRESSED AIR, Meters.

Moist, Changes of State. Changes of State in Moist Air (Zustandsänderungen feuchter Luft in zeichnerischer Darstellung), J. Huber. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 9 and 10, May 15 and 31, 1924, pp. 79-81 and 87-90, 9 figs. Gives new diagram for moist air, points out most frequent changes of state shown therein, and gives examples showing how diagram can be used to advantage.

Odor Elimination. See AIR CONDITIONING, Odor Elimination.

Pollution by Smoke. The Automatic Measurement of Atmospheric Pollution, J. S. Owens. Chem. & Industry, vol. 43, no. 35, Aug. 29, 1924, pp. 866-871, 7 figs. Describes automatic recording apparatus developed by author primarily designed for measurement of smoke pollution in city air; comparison between automatic filter and jet dust counter; results obtained with automatic filter.

Pressure and Velocity. Acoustical Sounding Devices (Sondes acoustiques), Z. Carrière. Jl. de Physique et le Radium, vol. 4, no. 11, Nov. 1923, pp. 413-419, 3 figs. Describes apparatus for recording instantaneous pressure and velocity of air in a space where air is in rapid periodic motion; industrial applications.

Refrigeration with. See REFRIGERATING MACHINES, Air.

Resistance of Moving Bodies in. See AERODYNAMICS, Resistance of Bodies to Air.

Temperature Measurement. See TEMPERATURE MEASUREMENT, Air.

AIR, COMPRESSED. See COMPRESSED AIR.

AIR COMPRESSORS

Angle Compound. An Angle Compound Air Compressor. Engineer, vol. 137, no. 3557, Feb. 29, 1924, pp. 224-225, 5 figs. New type of air compressor, manufactured by Sullivan Machy. Co., London, cylinders of which are set at right angles in horizontal and vertical positions, round single crank; engine is of uniflow class, but has valves to control exhaust.

Centrifugal. Centrifugal Compressors with Steam and Electric Drive (Kreiselverdichter mit Dampf- und elektrischem Antrieb), E. Blau. Technische Blätter, vol. 14, no. 29, July 19, 1924, pp. 217-218. Discusses construction of compressors and parts; pressure-volume curves of performance; steam driving by turbines and electric driving, and their advantages.

Coal Mines. See COMPRESSED AIR, Coal Mines.

Cylinder Lubrication. Air Compressor Cylinder Lubrication. Lubrication, vol. 10, no. 3, Mar. 1924, pp. 25-36, 14 figs. Temperatures involved; basic construction features of several types of air compressors; compressor-oil requirements; methods of air-cylinder lubrication; air-compressor explosions.

Development for Track Work. Development of the Air Compressor for Track Work and the Uses to Which It Can Be Put, W. F. Nichols. Compressed Air Mag., vol. 29, no. 9, Sept. 1924, pp. 993-994, 6 figs. Describes 4-tool, 8-tool and 12-tool machines for tamping ties, drilling holes for bond wires, running up track nuts on new rail, etc. Abstract of paper read before Int. Track Supervisors' Club, Buffalo, N. Y.

Diesel-Engine. Diesel-Engine Air Compressors, Rob. Melrose. Power, vol. 60, no. 21, Nov. 18, 1924, pp. 800-801, 1 fig. Common troubles and symptoms that precede them.

Electric Motors for. The Application of A. C. Polyphase Motors to the Drive of Piston Air Compressors (Remarques sur l'application des moteurs électriques à courants alternatifs polyphasés à la commande de compresseurs d'air à pistons), A. Barjou. Revue Générale de l'Electricité, vol. 15, no. 5, Feb. 2, 1924, pp. 167-173, 6 figs. Based on study of function of compressors of constant speed, author concludes that only self-starting synchronous and asynchronous induction motors are suitable for drive of such compressors, and in most cases, former is preferable.

Five-Stage. Five-Stage Air Compressor. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 498-499, 4 figs. Designed by Belliss & Morcom for supplying high-pressure air for coal-mine locomotives used for underground haulage.

Gas-Engine-Driven. Four-Cycle Gas-Engine-Driven Compressor. Min. & Oil Bul., vol. 10, no. 8, Aug. 1924, pp. 843-844 and 873, 2 figs. Describes new four-cycle gas-engine-driven compressor manufactured by Bessemer Gas Engine Co., Grove City, Pa.; combines simplicity and sturdiness with advanced engineering.

Heating of, Prevention. Prevention of Air Compressor Heating, R. A. Cultra. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 965-967, 4 figs. Dust drawn in with air mixes with oil and causes valves to stick, resulting in heating and loss of efficiency.

High-Speed. High-Speed Air Compressors, J. M. Walshe. Iron & Coal Trades Rev., vol. 108, no. 2916, Jan. 18, 1924, pp. 98-99. Automatic control of air output; air-cylinder lubrication; explosions in air receivers and pipes; air pipework; air receivers; turbo-compressors.

Impurities in Intake. Keeping Solid Impurities Out of the Air-Compressor Intake, Wm. V. Fitzgerald. Power, vol. 59, no. 16, Apr. 15, 1924, pp. 599-600, 1 fig. Points out that in analyzing troubles in air-compressor operation, single cause for all is frequently found, namely, impurities in intake air.

Lubrication. Air Compressor Lubrication. Southern Engr., vol. 41, no. 5, July 1924, pp. 44-46, 3 figs. Gives factors of correct lubrication, correct oils for common practice, and methods of application.

Motorships. Air Compressing Machinery. Engineering, vol. 117, no. 3043, Apr. 25, 1924, p. 541, 4 figs. on p. 542 and supp. plate. Describes twin 3-stage air compressor for motorships exhibited by Belliss & Morcum at Brit. Empire Exhibition.

Piston. Chart for Graphic Determination of Main Dimensions and Data of Piston Compressors (Rechentafel zur graphischen Ermittlung der Hauptabmessungen und daten von Kolbenkompressoren), H. Heinssen. Maschinenbau, vol. 3, no. 11, Mar. 13, 1924, pp. 364-366, 1 fig. Chart for graphic determination of piston strokes and average piston speeds of piston compressors with given suction performance, r.p.m., and cylinder conditions (relation of cylinder diam. to piston stroke).

Portable. Portable Air Compressor Sets. Engineering, vol. 117, no. 3039, Mar. 28, 1924, pp. 398-400, 8 figs. Modifications introduced by Globe Pneumatic Eng. Co., London., including new type of light-weight set on much improved frame and carriage, specially designed to conform to regulations regarding trailer vehicles.

Portable Compressors, F. A. McLean. Can. Min. Jl., vol. 45, no. 21, May 23, 1924, pp. 503-506, 5 figs. Notes on their use in mining and contracting.

Portable Gasoline-Driven Compressors Cut The Cost of Opening Up Isolated Mining Properties, F. A. McLean. Compressed Air Mag., vol. 29, no. 12, Dec. 1924, pp. 1082-1084, 4 figs. Describes work being done by Manley O'Reilly Gold Mines, Ltd., in opening up gold prospect in Northern Ontario, showing value of portable compressors for shaft sinking on isolated properties; also gives example showing results obtained in tunnel driving in copper-mining district, Marysville, Mont.

The "Broomaster" Portable Air Compressor. Engineering, vol. 118, no. 3057, Aug. 1, 1924, p. 179, 1 fig. Shown at Wembley exposition by Broom and Wade, Ltd.; engine and compressor, having two cylinders each, combined in a single unit.

Pulsations in Power. Pulsations Due to Synchronous Motor Drives, Q. Graham. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 342-344, 4 figs. Use of synchronous motors for driving compressors may cause severe pulsations in power on line supplying motors; cause and effects of pulsations.

See also ELECTRICAL MACHINERY, Pulsations in Power.

Railway Compressor Car. See CARS, Air-Compressor.

Rotary. Rotary Compressors (Rotationskompressoren), Benedict. Praktische Maschinen-Konstrukteur, vol. 57, no. 33, Sept. 2, 1924, pp. 457-458. Discusses favorable efficiency of rotary machines and describes Demag-Wittig compressor; comparison of piston and rotary machines.

Semi-Portable. Semi-Portable Air Compressing and Pumping Sets. Engineering, vol. 117, no. 3040, Apr. 4, 1924, pp. 432-433, 6 figs. Describes self-contained air-compressing unit supplied by Parsons Co., with standard Parsons 3-cylinder engine, and single-cylinder kerosene engine for driving centrifugal pump, whole forming semi-portable pumping unit.

Steam-Driven. Two-Stage Steam-Driven Air Compressor. Engineering, vol. 118, no. 3072, Nov. 14, 1924, pp. 690-692, 3 figs. Plant constructed by Browett, Lindley & Co., consists of vertical compound steam engine, above which cylinders of 2-stage air compression are mounted.

Theory of. See PUMPS, Theory of.

Turbo. See High-Speed.

AIR CONDITIONING

Air Cleaners. Determining the Efficiency of Air Cleaners, A. M. Goodloe. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 115-119, 5 figs. Apparatus and method for determining by weight efficiency of average commercial cleaner, devised primarily for purpose of making a forced efficiency test of air cleaners in a laboratory or shop.

Bakeries. See BAKERIES.

Cooling and. Cooling and Conditioning of Air, H. J. Macintire. Southern Engr., vol. 41, nos. 1 and 2, Mar. and Apr. 1924, pp. 59-61 and 42-43, 3 figs. A problem is given and method of making calculations is worked out. Eliminator surface, coolers, and spray nozzles for cooling air.

Drying. Adjustment of Air to Certain Degrees of Dryness or Moisture by Means of Salts, etc., and the "Relative Drying Capacity" of the Substances as a Measure of Their Hygroscopicity (Die Einstellung von Luft auf bestimmte Trocknungs- oder Feuchtungsgrade mit Hilfe von Salzen und ähnlichen Stoffen, und das "relative Trocknungsvermögen" der Stoffe als Mass ihrer Hygroskopie), J. Obermiller. Zeit. für Physikalische Chemie, vol. 109, no. 3-4, May 5, 1924, pp. 145-164.

Humidifying Systems. Air-Conditioning Plant in Textile Works. Sulzer Tech. Rev., no. 2, 1924, pp. 8-14, 8 figs. Describes Sulzer system of air-humidifying plants.

The Andrew Humidifying System. Engineering, vol. 118, no. 3078, Dec. 26, 1924, pp. 873-874, 6 figs. Describes system and apparatus which can

be arranged to be entirely automatic in its action or to be controlled by hand; for use in textile factories.

Odor Elimination. Odor Elimination, A. L. Fales. Boston Soc. Civil Engrs.—Jl., vol. 11, no. 4, Apr. 1924, pp. 135-176 and (discussion) 176-186. Nature of odors in general, possible methods of odor elimination, principal sources of objectionable odors, including sewage-treatment plants, garbage-disposal works, and certain industrial plants, particularly packing houses and allied industries, and suggestions with reference to study and research as well as practical investigations and tests to advance art of odor elimination.

Sterilization. Importance of Bactericidol in Sterilizing Air (Die Bedeutung des Bactericidols für die Entkeimung der Luft). Rauch u. Staub, vol. 14, Sept. 22, 1924, pp. 85-87, 17 figs. Discusses simultaneous extraction of dust and germs from air and gives results of tests with Bactericidol.

Theaters. Downward-Diffusion Air Conditioning System For a Large Theatre. Heat. & Vent. Mag., vol. 21, no. 3, Mar. 1924, pp. 57-58, 16 figs. partly on pp. 64-65. How Grauman's Metropolitan Theater, Los Angeles, Cal., is heated, humidified, and ventilated in winter and cooled in summer.

AIR COOLING

Chocolate-Dipping Factory. Practical Notes On The Cooling of Air, H. J. Macintire. Heat & Vent. Mag., vol. 21, no. 5, May 1924, pp. 44-47, 3 figs. Data covering a typical mechanical refrigeration installation in a chocolate-dipping factory.

AIR CRAFT. See AIRCRAFT.

AIR FILTERS

Dust Separators. The Dry Filter as a Dust Separator, E. Vernon Hill. Sheet Metal Worker, vol. 15, nos. 20 and 22, Oct. 24 and Nov. 21, 1924, pp. 743-745 and 766, and 826-827, 9 figs. Oct. 24: How and why it works; tests showing efficiency with different characters and quantities of dust. Nov. 21: Comparative data from tests on installation and using both air washer and dry filter.

Types. Air Filters and Ventilating Plants (Luftfilter für Lüftungsanlagen), B. Richter. Rauch u. Staub, vol. 14, Sept. 22, 1924, pp. 88-94, 10 figs. Discusses types of pocket air filters and filtering plants, air preheating and ventilating plants.

AIR FURNACES

Pulverized-Coal-Fired. See PULVERIZED COAL, Malleable Furnaces.

AIR HEATERS

Weldex. The Weldex Air Heater. Engineer, vol. 138, no. 3579, Aug. 1, 1924, pp. 139-140, 2 figs. Describes air heater made by Victoria Tube Co., Ltd., of Great Bridge, Staffordshire, Eng., which is claimed to be particularly suited for use in factories, workshops, paper mills, dye houses, all descriptions of drying operations, air washing for theaters, etc., and for certain process work. Consists in a number of sets of vertical heating tubes arranged between a pair of top and bottom tubes to form a grid or section. Special advantages claimed by makers.

AIR LIFTS. See PUMPS, Air-Lift.

AIR MAIL. See AVIATION, Air-Mail Service.

AIR PREHEATERS. See FUELS, Liquid and Gaseous.

AIR PUMPS

Contraflo Reciprocating. Contraflo Reciprocating Air Pumps; Empire Exhibition. Engineering, vol. 118, no. 3069, Oct. 24, 1924, p. 573, 2 figs. Constructed by Vickers and specially designed for marine use, but can be applied to land installations where conditions are suitable.

Piston. Piston Air Pumps (Die Kolbenluftpumpen), Fördertechnik u. Frachtverkehr, vol. 17, no. 17, Sept. 3, 1924, pp. 232-234, 8 figs. Construction of valve and slide-valve pumps, pipe lines and parts.

Water vs. Steam-Jet. Water and Steam-Jet Air Pumps for Surface Condensers Especially on Board Ships (Wasser- und Dampfstrahl-Luftpumpen für Oberflächenkondensatoren insbesondere auf Schiffen). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 12, Mar. 22, 1924, pp. 288-292. Contributions from representatives of steam-jet pumps, with and without intermediate coolers, challenging statements on superiority of water-jet pump contained in articles by Blaum and Richter in same journal (vol. 67, nos. 39-40 and 45, pp. 956 and 1042, 1923); replies from Blaum and Richter are included.

Water- vs. Steam-Jet Air Pumps (Wasserstrahl- oder Dampfstrahlluftpumpe?), S. v. Le Juge. Wärme, vol. 47, no. 3, Jan. 18, 1924, pp. 21-23, 2 figs. Shows by comparison that the steam-jet pump, because of inadequate sub-cooling of mixture, delivers a much poorer vacuum with same steam consumption than a water-jet air pump, as constructed by H. P. Müller.

AIR SEPARATORS. See BOILERS, Corrosion.

AIRCRAFT

Accessories. British Aeronautical Accessories. Flight, vol. 16, no. 22, May 29, 1924, pp. 340-346, 20 figs. Brief descriptions of accessories put out by the various firms.

Airplanes. See AIRPLANES.

Airships. See AIRSHIPS.

Balloons. See BALLOONS.

British Industry. Problems of Aircraft Production in Great Britain. Aviation, vol. 16, no. 6, Feb. 11, 1924, pp. 151-153. How Great Britain fosters her aircraft industry.

The British Aircraft Industry. Flight, vol. 16, no. 22, May 29, 1924, pp. 302-304. Brief outline of past history and present activities of the various British aviation firms and airplane-engine firms, with a short reference to those responsible for conduct of firms.

Carrier Ships. See NAVAL AIRCRAFT, Carriers.

Duralumin Columns for. Tests on Duralumin Columns for Aircraft Construction, J. G. Lee. U. S. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 208, Nov. 1924, 4 pp., 4 figs. on supp. plates. Notes based on results of tests, contained in two theses presented to Dept. Civil and Sanitary Engineering of Mass. Inst. Technology.

Engines. See AIRPLANE ENGINES.

Flying Boats. See FLYING BOATS.

French and German Industries. The French and German Aircraft Industries. Aviation, vol. 16, no. 24, June 16, 1924, pp. 643-644. Special reference to their dealings with governments.

Helicopters. See HELICOPTERS.

Instruments. See AERONAUTICAL INSTRUMENTS.

Kites, Man-Lifting. See KITES.

Metal Construction. The Metal Construction of Aircraft. Aeroplane, vol. 26, no. 4, Jan. 23, 1924, pp. 76 and 78 (includes discussion). Abstract of two papers on Materials in Aircraft Construction read by J. D. North and L. Aichison before Roy. Aeronautical Soc., together forming a whole, illustrating advantages to be derived from improved materials of construction and also some of the

difficulties and dangers which are to be encountered in pioneer work in this direction. See also Flight, vol. 16, no. 4, Jan. 24, 1924, pp. 48-52, 6 figs., giving a more detailed account of L. Aitchison's paper, dealing with physical qualities of metals and alloys, particularly from point of view of reliability of such materials as conditioned by margin between ideal or specification strength and real strength which is achieved in practice.

Naval. See NAVAL AIRCRAFT.

Paris Show. Ninth International Aeronautical Exposition, Paris, Dec. 5-21, 1924 (La IX^{e} Exposition internationale de l'Aéronautique, Paris, 5-21 décembre 1924), A. Lesage. Génie Civil, vol. 85, nos. 24 and 25, Dec. 13 and 20, 1924, pp. 539-548 and 571-579, 100 figs. Description of principal exhibits, including French airplanes and airplanes of other countries, dirigibles, French engines and engines of other countries, screw propellers, starters, carburetors, etc.

Safety Code for. See SAFETY CODES, Aeronautical.

Seaplanes. See SEAPLANES.

AIRCRAFT CONSTRUCTION MATERIALS

Aluminum Alloys. See ALUMINUM ALLOYS, Airplane Structural Work.

Cellulose Varnish. Cellulose and the Use of Cellulose Esters in Aeronautics (Ueber Zellulose und die Verwendung von Zelluloseestern in der Flugtechnik), E. Rackwitz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 20, Oct. 28, 1924, pp. 219-220. Uses of cellulose varnishes in aircraft construction.

Dopes. Dopes and Fabric, J. E. Ramsbottom. Roy. Aeronautical Soc.—Jl., vol. 28, no. 161, May 1924, pp. 273-305 and (discussion) 305-314, 16 figs. Deals with dopes and fabric as far as they relate to problem of production of structural covering for aircraft which will maintain its tautness under varying conditions of humidity and also retain its strength after prolonged weathering.

Fabrics. Testing Airplane Fabrics, A. Pröll. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 186, Apr. 1924, 33 pp., 8 figs. Air pressure and tensions in fabric; requirements for fabric; determination of initial tension; interpretation of experiments with stretching frame; curves facilitating calculation of tensions and initial tensions; application of experiments on frames to investigation of wings; calculation for dropped-ball test. Translated from Technische Berichte, vol. 3, no. 7.

See also Dopes.

Light Metals. The Non-Ferrous Metals with Special Regard to Airplanes (Die Nichteisenmetalle unter besonderer Berücksichtigung der Luftfahrzeuge), E. H. Schulz. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 545-550, 5 figs. Importance of light metals and alloys for construction of aircraft; properties and treatment; pure aluminum; duralumin; other alloys; cast aluminum alloys; silumin; magnesium alloys; electron metal; future prospects.

Metallic. Metals Used in Airplane Construction, F. O. Carroll. Iron Age, vol. 113, no. 17, Apr. 24, 1924, pp. 1203-1206, 6 figs. Duralumin all-metal planes; carbon and alloy steels for certain parts; advantages and disadvantages over wood; latest developments.

Metals Used in World Cruiser Airplanes, J. B. Johnson. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 994-995, 3 figs. Steel tubes and wire and aluminum alloys in fuselage; alloy steels and future planes.

Some Materials in Aircraft Construction. Roy. Aeronautical Soc.—Jl., vol. 28, no. 160, Apr. 1924, pp. 226-248 and (discussion) 248-259, 6 figs. First article, by J. D. North, discusses materials which should be used to give lightest structure. Second article, by L. Aitchison, deals with properties of metallic aircraft materials.

Metals. See AIRCRAFT, Metal Construction; AIRPLANES, All-Metal.

Plywood. Some Recent Developments in the Use of Wood in Airplane Construction, W. M. Moore. Jl. of Forestry, vol. 22, no. 4, Apr. 1924, pp. 353-371. Kinds of wood used, species of wood permitted by Air Service specifications, use of plywood, defects in wood which affect its suitability for airplane manufacture, storage of airplane parts, balloon baskets, and wood versus metal in airplane construction.

Three-Ply and Its Uses in Aircraft Construction, R. N. Liptrot. Instn. Aeronautical Engrs., Min. of Proc. No. 8, 1923, pp. 7-17 and (discussion) 18-22. Discusses physical properties of plywood; shrinkage and prevention of warping; effect of number of piles; figures for use in design; method of manufacture; true monocoque fuselage, semi-monocoque type, and three-ply braced fuselages.

Use of Balsa Wood in Plywood, R. L. Hankinson. U. S. Air Service Information Circular, vol. 5, no. 473, Sept. 1, 1924, 2 pp. Results of investigation to obtain a small amount of data to compare with data previously obtained on plywood in which cores were made from species of relatively high specific gravity.

Shock-Absorber Cord. Braided Rubber Shock Absorber Cord for Aircraft, L. Rowland. Instn. Aeronautical Engrs.—Proc., no. 12, 1924, pp. 7-15 and (discussion) 16-23, 4 figs. Problems which arise in its manufacture are chiefly due to fact that it consists of two materials which differ widely in physical and mechanical properties, namely, rubber and twine; it is on combined effect of these two materials that production of efficient or inefficient cords depends.

Steel and Duralumin Tubing. Torsional Strength of Nickel Steel and Duralumin Tubing as Affected by the Ratio of Diameter to Gage Thickness, N. S. Otey. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 189, Apr. 1924, 8 pp., 15 figs. on supp. plates. Tests to determine extent of variations of torsional modulus of rupture with ratio of diameter to gage thickness.

AIRFOILS

Theory of. See AERONAUTICS, Flow, Theory of.

AIRPLANE ENGINES

Accessories. Airplane Engine Accessories (Les accessoires des moteurs d'avions), J. A. Lefranc. Nature (Paris), vol. 52, no. 2639, Nov. 1, 1924, pp. 275-285, 13 figs. Discusses transmission of power to airscrews, two- and four-blade screws, motor starting, cooling and mounting of engines, and fuel feeding.

Air-Cooled. Air-Cooled Airplane Engines (Luftgekühlte Flugmotoren), E. Gosslau. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 36, Sept. 6, 1924, pp. 921-925, 15 figs. Details of some 50 engines; limiting number of cylinders; diameters of cylinders and engine capacity; saving weight by eliminating water cooling; fuel and oil consumption; increase of performance by higher compression and r.p.m., etc.

Radial Air-Cooled Aero Engines, A. H. R. Fedden. Roy. Aeronautical Soc.—Jl., vol. 28, no. 160, Apr. 1924, pp. 260-267. Outlines advantages and disadvantages of static air-cooled radial engine, and attempts to analyze problems peculiar to it.

Two Gages for Aero-Engine Cylinders, W. H. Thompson. Am. Mach., vol. 60, no. 8, Feb. 21, 1924, pp. 297-298, 3 figs. Describes combination gages for inspecting various dimensions on air-cooled cylinders.

Altitude Tests. The Testing of Aviation Engines under Approximate Altitude Conditions, R. N. DuBois. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 210, Dec. 1924, 7 pp., 5 figs. on supp. plates. Notes based upon tests made in altitude laboratory of Bur. of Standards to determine value of approximate method of test.

Anzani. See French Types.

Bristol Cherub. The New Bristol Cherub. Aeroplane, vol. 26, no. 23, June 4, 1924, pp. 474 and 476, 3 figs. Is of two-cylinder opposed type and has total cylinder capacity of just under 1100 cc.; bore 3.35 in., stroke 3.80 in., pistol displacement 66.8 cu. in., normal output 22 b.hp. at 2500 r.p.m.

Bristol-Jupiter. See Details.

British Types. British Aero Engines. Flight, vol. 16, no. 22, May 29, 1924, pp. 331-339, 24 figs. Particulars such as power, weight, consumption, etc., of all modern British airplane engines; details of two small engines which have proved suitable for light airplanes, and of one engine which is as yet experimental.

See also Rolls-Royce; Scorpion.

Clerget-Renault. See French Types.

Commercial-Airplane. The Use of Existing Engines on Commercial Planes (L'Utilisation des Moteurs d'Aviation existant sur les appareils civils). Aérophile, vol. 31, no. 23-24, Dec. 1-15, 1923, pp. 361-365, 4 figs. It is shown that by reducing torque, i.e., mean effective pressure, 10 per cent, life of engine is doubled; it is therefore concluded that existing military engines could be used with profit in commercial planes, provided they are not driven to maximum speeds and torques of which they may be capable. See also abstract in Génie Civil, vol. 84, no. 5, Feb. 2, 1924, p. 119.

Compression Ignition. The Influence of Inlet Air Temperature and Jacket Water Temperature on Initiating Combustion in a High Speed Compression Ignition Engine, R. Matthews and A. W. Gardiner. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 185, Mar. 1924, 12 pp., 7 figs. Deals with some tests to determine influence on initiating combustion in one-cylinder compression ignition engine of (1) inlet air temperature, and (2) jacket-water temperature.

Compression Pressure, Increasing. Increasing the Compression Pressure in an Engine by Using a Long Intake Pipe, R. Matthews and A. W. Gardiner. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 180, Feb. 1924, 9 pp., 5 figs. Investigation covering engine speeds between 500 and 1800 r.p.m.; data obtained are included in form of curves.

Results of Experiments on the Increase of Compression in Airplane Engines (Résultats d'expérience sur l'augmentation de la compression dans les moteurs d'aviation), P. Dumanois. Académie des Sciences—Comptes rendus des séances, vol. 178, no. 27, June 30, 1924, pp. 2236-2238. Confirmation of theory as to advisability of very high compression by using non-detonating fuel, like benzol, which does not detonate with oil.

Compression Variations and Efficiency. French Tests Show Effect of Compression Variations on Engine Efficiency. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, p. 856. Theoretical calculations checked up by practical experiments made with 8-cylinder aircraft engine. Abstracted from communication by P. Dumanois to Acad. of Sci.

Condor. The Rolls-Royce "Condor," Series III. Flight, vol. 16, no. 32, Aug. 7, 1924, pp. 494-500, 20 figs. Engine is of 12-cylinder water-cooled "vee" type, with cylinder banks placed at angle of 60 deg.; bore, 5½ in.; stroke, 7½ in.; normal b.hp., 650; maximum speed (crankshaft), 2100 r.p.m.

Connecting Rods. See CONNECTING RODS, Machining.

Cylinder Gages. See Air-Cooled.

Cylinders. See CYLINDERS, Oval, for Airplane Engines.

Design. Airplane-Engine Designing for Reliability, Geo. J. Mead. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 277-285, 13 figs. Recent performances; lessons learned from duration testing; design of connecting rod; defects developed by duration running; Wright T-3 engine; application of experience to future design; development, production, and operation of design.

The Airplane Engine: Actual Achievements and Tendencies (Le moteur d'aviation: résultats acquis et tendances actuelles), G. Lehr. Aéronautique (Aerotechnique), vol. 6, no. 56, Jan. 1924, pp. 3-10, 13 figs. Problems involved in improvement of design.

Details. New Aeronautical Engines (Les nouveaux moteurs d'aviation), J.-A. Lefranc. Nature (Paris), vol. 52, no. 2631, Sept. 6, 1924, pp. 147-157, 10 figs. Details of recent engines, including 400-hp. Bristol-Jupiter, 450-hp. Panhard, 600-hp. Farman, and others. See also (translation) Mech. Eng., vol. 46, no. 11, Nov. 1924, p. 705.

Electric Auto-Charging. Electric Auto-Charging of Aircraft Engines (Untersuchungen über die elektrische Selbstaufladung von Luftfahrzeug-Motoren), A. Wigand and T. Schlomka. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 13-14 and 17-18, July 26 and Sept. 26, 1924, pp. 153-156 and 185-192, 6 figs. July 26: New apparatus developed by authors makes possible measurement of charge potential; describes efforts to construct collector which would speedily assume potential of surrounding atmosphere; details and principle of form finally adopted. Sept. 26: Results of investigation.

Evolution. The Evolution of Aircraft Engines (L'évolution des moteurs d'aviation), Martinot-Lagarde. Technique Moderne, vol. 16, no. 7, Apr. 1, 1924, pp. 195-207, 19 figs. General characteristics; principal types—water-cooled and air-cooled engines; rôle of light metals; factors influencing efficiency of engines; compression; engines for high altitudes and high speeds; means of reducing power loss with altitude; setting and installation of engines; technical details of cylinder construction; new cycles for automobiles and aviation.

Farman. The Farman F. 62. Flight, vol. 16, no. 34, Aug. 21, 1924, pp. 523-524, 3 figs. Describes Farman aero engine, type 12 WD, which was fitted in F. 62; engine is of "broad arrow" type with 12 cylinders in three banks of four each; cylinder bore, 130 mm.; stroke, 160 mm.

See also Details.

French Developments. The Great Efforts of French Industry toward Development of New Engines (Le grand effort de l'industrie française vers les moteurs nouveaux). Aérophile, vol. 32, nos. 3-4 and 5-6, Feb. 1-15 and Mar. 1-15, 1924, pp. 61-64 and 102-105, 10 figs. Review of progress made in design of airplane engines and examination of different types, including nearly all of well-known French makes.

French Types. Some French Light 'Plane Engines. Flight, vol. 16, no. 8, Feb. 21, 1924, pp. 104-106, 7 figs. Principal characteristics and features of Anzani 2-cylinder, Clerget-Renault 2-A 2-cylinder, Gnome-Rhone 2-cylinder, Salmson A.D.-3 3-cylinder, Sergant 4-cylinder, and Vaslin 4-cylinder engines.

Fuel-Air Ratio, Relation to Performance. Relation of Fuel-Air Ratio to Engine Performance, S. W. Sparrow. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 189, 1924, 16 pp. 18 figs. Concludes that (1) with gasoline as fuel, maximum

power is obtained with fuel-air mixtures of from 0.07 to 0.08 lb. of fuel per lb. of air; (2) maximum power is obtained with approximately same ratio over range of air pressures and temperatures encountered in flight; (3) nearly minimum specific fuel consumption is secured by decreasing fuel content of charge until power is 95 per cent of its maximum value.

Fuel Pumps. Engine Driven Gear Fuel Pumps Type "C," H. C. Osborne. U. S. Air Service Information Circular, vol. 5, no. 464, May 1, 1924, 30 pp., 24 figs. Necessity for an engine-driven pump; history of engine-driven fuel pump development up to "C" pumps; history of type "C" pumps; gear pump theory; description of "C-5" pump, and its installation on engine; description of gear pump fuel system; gear pump in service; overhall of gear pump; comparison of "C-5" pump with other fuel pumps.

The Bellows (Sylphon) Fuel Pump for Liberty "12" and Wright "H" Engines, H. C. Osborne. U. S. Air Service Information Circular, vol. 5, no. 458, Mar. 15, 1924, 6 pp., 6 figs. Description of pump; overhaul; installation; precautions.

German Development. The Development of Airplane Engines Since the War (Die Entwicklung des Flugmotors seit dem Kriege), H. Baer. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 539-544, 11 figs. Summary of types developed since war in Germany; construction parts, such as cylinders, pistons, bearings, lubrication, steering, ratio of compression, maximum cylinder dimensions, etc.; the light airplane engine.

Gnome-Rhone. See French Types.

High Power. Progress toward 1000 Hp. Aircraft Engines, G. D. Angle. Aviation, vol. 16, no. 8, Feb. 25, 1924, pp. 198-200, 2 figs. See also Am. Mach., vol. 61, no. 5, July 31, 1924, pp. 181-184, 6 figs. Advantages of single engine; Rolls-Royce Condor; Fiat A14 engine; big engines in France; 1000-hp. Lorraine-Dietrich; Napier cub; American developments; Air Service W1A engine.

High Speed. Comparison of Three Types of Airplane Engines (Comparaison de trois types de moteurs d'aviation), M. Martinot-Lagarde. Technique Moderne, vol. 16, no. 15, Aug. 1, 1924, pp. 519-522, 4 figs. Details of design and construction of Renault, Lorraine-Dietrich and Farman engines of 400 to 600 hp., their equipment and efficiency; gives tables of principal characteristics.

Jaguar. See AIRPLANES, Siskin Fighting.

Light. A New Engine for Light Planes, G. D. Angle. Aviation, vol. 16, no. 6, Feb. 11, 1924, pp. 146-147. Engine built by Steel Products Eng. Co., Springfield, Ohio, is air-cooled 2-cylinder opposed type operating on 4-cycle principle; develops 12 to 20 hp. and weighs only 50 lb.

The Engines Used in the Competitions. Flight, vol. 16, no. 39, Sept. 25, 1924, pp. 625-628, 7 figs. Brief description of each of the four engines taking part in two-seater light-airplane competition to be held by British Air Ministry at Lympne, Sept. 29-Oct. 4, 1924, viz., A. B. C. "Scorpion," British Anzani, Blackburne radial and Bristol "Cherub."

See also British Types.

Mounting. Mounting of Air Screw Groups Considered From the Point of View of Security in Aerial Navigation (Le montage des groupes motopropulseurs considéré au point de vue de la sécurité de la navigation aérienne), Volmerange. Bul. Technique du Bureau Veritas, vol. 6, no. 11, Nov. 1924, pp. 211-212. Discusses engine vibrations, difficulty of inspecting and dismounting, leakages, pipe lines, danger of fire, etc.

Napier, Manufacture of. The Napier Aero Engines. Flight, vol. 16, no. 44, Oct. 30, 1924, pp. 698-701, 11 figs. Impressions of their manufacture.

Oil Cleaning. An Effective Method of Cleaning Engine Oil, G. D. Angle. Aviation, vol. 17, no. 24, Dec. 15, 1924, pp. 1398-1399, 3 figs. Results obtained on W1A engine, making use of centrifugal cleaning principle; advantages of use of oil plugs.

Panhard. See Details.

Paris Show. The Paris Aero Show. Aeroplane, vol. 27, no. 26, Dec. 24, 1924, 8 pp. between 610-624, 12 figs. Review of engine exhibits, arranged alphabetically according to makers; includes list of specifications of all engines exhibited.

Poppet Valves for. See VALVES, Materials, Tests of.

Power Measurements, Correction of. Correcting Horsepower Measurements to a Standard Temperature, S. W. Sparrow. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 190, 1924, 14 pp., 16 figs. Discusses relation between temperature of air at entrance to carburetor and power developed by engine; consideration of range of temperatures likely to result from changes of season, locality, or altitude.

Radial. See Air-Cooled.

Radiators. Modern Radiators for Aeronautical Engines. Aviation, vol. 16, no. 20, May 19, 1924, pp. 536-537, 4 figs. New Lamblin radiator consists of manifold fixed to front of wing spar or of strut of landing gear and it is divided into two parts by partition; advantages of 1924 over 1922 model.

The Andre Hexagonal Tube Radiator, R. F. Steidel. Aviation, vol. 16, no. 26, June 30, 1924, pp. 697-698, 7 figs. Basic feature of improved honeycomb radiator manufactured by French concern; results of official tests; how weight is saved.

Rolls-Royce Condor III. The Rolls-Royce Condor III Aero Engine, W. H. Sayers. Aeroplane, vol. 26, no. 11, Mar. 12, 1924, pp. 222, 224, 226 and 228-229, 12 figs. Description of a 12-cylinder engine developing a normal b.hp. of 650 at 1900 r.p.m.

Salmson. Salmson Aviation Engines (Les Moteurs d'aviation Salmson). Aérophile, vol. 32, no. 1-2, Jan. 1-15, 1924, pp. 33-34, 2 figs. Describes different types of air- and water-cooled engines constructed by Salmson firm.

See also French Types.

Sample Tests. Sample Tests of Aircraft Engines (Musterprüfungen von Flugmotoren), Rich. Roth. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 7-8, Apr. 26, 1924, pp. 57-61, 6 figs. Brief outline of test regulations for aircraft engines and examples showing how they are carried out.

Scorpion. The A. B. C. "Scorpion." Flight, vol. 16, no. 28, July 10, 1924, pp. 441-443, 6 figs. Gives brief description of its main features and points out that with very small changes, apart from reduction in bore, "Scorpion" was converted from car engine into light-plane power plant; is two-cylinder opposed air-cooled engine with bore of 3.435 in. and stroke of 3.6 in.

Sergant. See French Types.

Specifications. Aircraft Engine Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, p. 463. American and British specifications.

Stedman Two-Stroke. A Novel Type of Two-Stroke. Flight, vol. 16, no. 17, Apr. 24, 1924, pp. 238, 5 figs. Describes engine patented and invented by L. B. Stedman which, in its simplest form, consists of a V-twin, in which one cylinder draws its charge from crankcase, while other is supplied initially from crankcase, but via a chamber surrounding crankcase.

Storage Preparations. Comparison Tests of Storage Preparations for Aviation Engine Storage

of Less than Six Months, S. A Christiansen. U. S. Air Service Information Circular, vol. 5, no. 451, Mar. 1, 1924, 9 pp., 15 figs. Test to investigate methods and make recommendations.

Supercharging. Airplane Turbo-Supercharger Development in the United States, D. Gregg. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 532-538, 17 figs. Supercharger types; supercharger operation; air cooler and fuel system; propeller types; oxygen-supply system; heating apparatus; sea-level pressure at great altitude; usefulness of turbo-supercharger.

Thermodynamics of. The Thermo-Dynamics of Aircraft Engines, H. R. Ricardo. Roy. Aeronautical Soc.—Jl., vol. 28, no. 158, Feb. 1924, pp. 49-75 and (discussion) 75-87, 17 figs. Deals with such factors as change of specific heat, interchange of heat, influence of latent heat, pre-burning, flame temperature and range of burning, influence of temperature and pressure of compression, stratified charge and supercharging.

Valves, Characteristics of Steels for. Characteristics of Material for Valves Operating at High Temperatures, J. B. Johnson and S. A. Christiansen. Am. Soc. for Testing Matls., Preprint of paper for meeting June 24-27, 1924, no. 19k, 19 pp., 12 figs. Requirements demanded of steels for service in valves of aircraft engines. Results of laboratory tests and single-cylinder and multiple-cylinder engine tests of steels proposed for valve use.

Valves and Guides. Exhaust-Valves and Guides for Aircraft Engines, S. D. Heron. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 122-132, 9 figs. Discusses valve cooling and valve and guide wear in connection with type-J air-cooled cylinder, developing 48 b.hp. at 1650 r.p.m., including internal valve cooling and methods of application, valve steels, valve guides, valve size, etc.

Vaslin. See French Types.

Water-Cooled. Water-Cooled Aero Engines, A. J. Rowledge. Automobile Engr., vol. 14, no. 186, Feb. 1924, pp. 50-54, 12 figs. Consideration of design; cooling system; cylinder construction; crankshafts; lubrication; engine suspension; gearing.

Wright. A New Type of Engine for Large Aircraft, G. D. Angle. Aviation, vol. 17, no. 5, Aug. 4, 1924, pp. 832-834, 4 figs. Gives main features of 80-deg. W-type engine of 18 cylinders.

Wright T-3. The Wright T-3 Engine. Aeroplane, vol. 26, no. 22, May 28, 1924, pp. 455 and 458, 4 figs. Twelve-cylinder V-type with an angle of 60 deg. between cylinders. Bore 5¾ in., stroke 6¼ in., piston displacement 1947 cu. in., normal output 600, normal speed 1900.

See also Design.

AIRPLANE PROPELLERS

Airfoil Theory and. Comparison of Model Propeller Tests with Airfoil Theory, Wm. F. Durant and E. P. Lesley. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 196, 1924, 26 pp., 61 figs. Examination of degree of approach which may be anticipated between laboratory tests on model airplane propellers and results computed by airfoil theory, based on tests of airfoils representative of successive blade sections.

Design. A Graphic Method for Determining Adaptability of Propellers to Airplanes (Méthode graphique pour l'adaptation des hélices aux avions), G. Delanghe. Génie Civil, vol. 84, no. 8, Feb. 23, 1924, pp. 185-187, 1 fig. Discusses elements of propellers, and develops method for determining, under given conditions, propeller with which maximum speed can be obtained with given course and altitude.

The Analysis of Free Flight Propeller Tests and Its Application to Design, M. M. Munk, U. S. Nat. Advisory Comm. for Aeronautics—Report no. 183, 1924, 12 pp., 20 figs. New and useful method suitable for design of propellers and for interpretation of tests with propellers.

The Application of Propeller Test Data to Design and Performance Calculations, W. S. Diehl. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 186, 1924. Study of test data on family of Durand's propellers (nos. 3, 7, 11, 82, 113, 139).

Development. Milestones in the Development of the Metal Air-Screw. Flight, vol. 16, no. 28, July 10, 1924, pp. 445-446, 2 figs. Progress made in development of metal airscrew covering period of seven years.

Micarta. Micarta Propellers, F. W. Caldwell and N. S. Clay. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, nos. 198, 199, 200, and 201, Aug. and Sept. 1924. Pamphlet No. 198: 9 pp., 4 figs., Materials. No. 199: 10 pp., 7 figs., partly on supp. plates., Method of construction. No. 200: 13 pp., 11 figs., partly on supp. plates., General description of design. No. 201: 17 pp., 15 figs., Technical methods of design.

Models, Turbine Drive for. Turbine Drive for Propeller Models, L. H. Crook. Franklin Inst.—Jl., vol. 199, no. 1, July 1924, pp. 85-91, 6 figs. Details of construction of air turbine for U. S. Navy aerodynamic laboratory to drive propeller in 8- by 8-ft. wind tunnel with air pressure of 90 lb. per sq. in. and its successful application.

Performance. See Design.

Slipstream Obstructions. The Effect of Slipstream Obstructions on Air Propellers, E. P. Lesley and B. M. Woods. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 177, 1924, 24 pp., 15 figs. Results of investigation show that combined efficiency of propeller with any obstruction in slipstream is less than that of propeller free and unobstructed.

Slipstream Theory. The Slipstream Theory in Its Practical Application (Die Strahltheorie in ihrer praktischen Anwendung), Wm. Hoff. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 7-8, Apr. 26, 1924, pp. 51-53, 4 figs. Study of slipstream theory as basis for air-propeller dimensioning.

Theory. Aerodynamics of Driving Screws (Zur Aerodynamik der Treibschraube), H. B. Helmbold. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 13-14 and 15-16, July 26 and Aug. 26, 1924, pp. 150-153 and 170-173, 5 figs. Discusses profile and movement of propeller in air current; develops formulas for velocity, etc., and applies them to calculation of efficient propellers; performance loss through profile resistance; frictionless propeller; design of propeller and development of theory.

The Theory of Air Propellers (Zur Theorie der Luftschrauben), Th. Bienen and Th. v. Kármán. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 48, Nov. 29, 1924, pp. 1237-1242 and 1315-1318, 19 figs. Deals with calculation of airplane propellers, but results, when properly applied, also hold good for ship propellers.

Wind-Tunnel Tests. The Effect of Wind Tunnel Interference on a Combination of Airscrew and Tractor Body, C. N. H. Lock and H. Bateman. Aeronautical Research Committee—Reports and Memoranda, no. 919, Apr. 1924, 6 pp., 7 figs. on supp. plates. Result of testing small-scale body and airscrew successively in 7-ft. and 4-ft. tunnel.

See also Design.

AIRPLANES

A-1. Wind Tunnel Test of the A-1 (Ambulance) Airplane, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 463, May 1, 1924, 13 pp., 26 figs. Results of tests made in 4-ft. and 7½-ft. wind tunnel at Mass. Inst. Technology

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on A-1 airplane, a single Liberty-motored single-bay biplane of diagonally braced, lower-wing, stub type, to determine aerodynamic characteristics.

Ailerons. Aileron Effectiveness, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 454, Mar. 15, 1924, 8 pp., 19 figs. Wind-tunnel tests of U. S. A.-35 (half-span) airfoil to determine aerodynamic efficiency of ailerons, hinge lines of which were skewed at various angles with transverse or y-axis.

On the Distribution of Lift Along the Span of an Airfoil with Displaced Ailerons, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 195, June 1924, 8 pp., 4 figs. Effect of aileron displacement on distribution of lift along span is computed for elliptic wing of aspect ratio 6 for three conditions.

Airfoils. Aerodynamic Characteristics of Airfoils. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 182, 1924, pp. 145-186, 132 figs. Continuation of reports on airfoil data.

Experimental Investigation of the Effect of an Oscillating Airstream (Katzmayr Effect) on the Characteristics of Airfoils, Toussaint, Merneis and Girault. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 202, Sept. 1924, 32 pp., 20 figs. on supp. plates. Experiments relating to action of air stream oscillating vertically on supporting surfaces, object of which was to verify results of Katzmayr's experiments, and, if possible, to obtain more complete data on effect of amplitude and velocity of oscillations of air stream.

Interesting New Glenn Martin Wings, Lessiter C. Milburn. Aviation, vol. 16, no. 1, Jan. 7, 1924, pp. 8-9, 3 figs. Medium thick and thick airfoils of high efficiency recently developed.

The Two-Dimensional Problem of the Flapping Wing (Das ebene Problem des schlagenden Flügels), W. Birnbaum. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 4, Aug. 1924, pp. 277-292, 8 figs. Supplementary to author's previous article in same journal, vol. 3, Aug. 1923, p. 290 (see reference in Eng. Index for 1923, p. 13) on supporting vortex surface, which forms basis of present investigation; attempts to show how methods developed in previous work can also be applied to air forces for a wing with laterally variable circulation; deals specially with theory of a periodically flapping wing in the manner of a bird's wing.

Wind Tunnel Test of 36" x 6" Airfoils, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 478, Oct. 1, 1924, 9 pp., 6 figs. Results of tests to obtain strictly comparable data on several promising airfoil sections at reasonably high values of (VL).

See also Wings.

Albatros. New Albatros Airplanes (Neue Albatros-Flugzeuge), G. Krupp. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 13-14, July 26, 1924, pp. 126-127, 3 figs. Details of L58 for seven passengers; 260-hp. Maybach engine; speed, 150km per hr.; L59 for sport, 55-hp. SH engine; L66 for two, with 30-hp. engine.

All-Metal. See Metal.

Ambulance. Development of Airplane Ambulances. Int. Aeronautics, vol. 1, no. 5, Dec. 1923-Jan. 1924, pp. 257-261, 8 figs. Notes on Liberty engine Fokker, a duplicate of Macready-Kelly transcontinental machine; carries 4 litter patients, 4 sitting patients and surgeon, in addition to pilot; medical equipment.

See also A-1.

Annular Type. The "Annular" Type of Aeroplane. Flight, vol. 41, no. 15, Apr. 10, 1924, pp. 204-207, 11 figs. Describes some early experiments with a wing form in which lifting surfaces were circular in plan, with a circular piece cut out of center so as to leave a wing of annular shape.

Armstrong-Whitworth. See Troop Carriers.

Automatically Piloted. See Manless.

Balancing Moments. Practical Method for Balancing Airplane Moments, H. Hamburger. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 179, Feb. 1924, 34 pp., 8 figs. Shows how methods described in previous paper (Technische Berichte, vol. 2, no. 3, p. 463) can be practically utilized in computations; it is shown what conclusions can be drawn from diagram of moments in regard to defects in airplanes under investigation and what steps may be taken to remedy them.

Beams. Deflection of Beams with Special Reference to Shear Deformations, J. A. Newlin and G. W. Trayer. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 180, 1924, 19 pp., 8 figs. Influence of form of wooden beam on its stiffness and strength.

Form Factors of Beams Subjected to Transverse Loading Only, J. A. Newlin and G. W. Trayer. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 181, 1924, 19 pp., 8 figs. Tests to determine factors to apply to usual beam formula in order that properties of wood based on tests of rectangular sections might be used as basis of design for beams of any section, and to develop formulas for determining such factors.

Biplanes. Pressure Distribution Over the Wings of, and Force Measurements on, a Model B. E. 2 C Biplane with Raked Wing Tips, A. S. Batson and H. L. Nixon. Aeronautical Research Committee, no. 891, May 1923, 31 pp., 21 figs. partly on supp. plate. Results of experiments show that in upper wing center sections reach critical angle before outer sections, causing relatively heavy loading near wing tips, etc.

Blackburn-Napier "Cubaroo." The Blackburn-Napier "Cubaroo." Flight, vol. 16, no. 35, Aug. 28, 1924, pp. 537-539, 7 figs. Also Automobile Engr., vol. 14, no. 193, Sept. 14, 1924, p. 274, 2 figs. Describes long-distance 3-seater torpedo-carrying plane with 1000 hp. Napier "Cub" engine; span of biplane wings, 88 ft.; overall length, 54 ft.; height, 20 ft.

Bleriot. See Commercial.

Boeing. See Training.

Bombers. See Gallaudet; Lioré-Olivier.

Braking Devices for Safe Landing. The Problems of Safe Landing for Airplanes, W. L. LePage. Aviation, vol. 16, no. 22, June 2, 1924, pp. 588-590, 1 fig. Deals with aerodynamic braking devices involving increase in drag and those involving increase of lift; mechanical braking devices.

Bristol. Aeronautics. Engineering, vol. 117, no. 3043, Apr. 24, 1924, pp. 550-553, 8 figs., partly on supp. plates. Describes exhibits of Vickers and of Bristol Aeroplane Co. at Brit. Empire Exhibition.

Bristol Brownie. The Bristol Brownie Light Plane. Aviation, vol. 17, no. 25, Dec. 22, 1924, p. 1434, 3 figs. Two-place plane with Bristol Cherub engine; high speed, 70 mi. per hr.; landing speed, 38 mi. per hr.; cruising range, 100 mi.

Brunet-Descamps. See Metal.

Caspar. The Caspar "C.17" Light Monoplane Two-Seater. Flight, vol. 16, no. 47, Nov. 20, 1924, pp. 730-731, 3 figs. Machine built by German firm, Caspar-Werke of Travemünde; A. B. C. "Scorpion" engine of 20 hp.

See also German Commercial.

Catron-Fisk. The Catron-Fisk "Constance" Touring Plane, Geo. B. Harrison. Aviation, vol. 17, no. 24, Dec. 15, 1924, p. 1402, 3 figs. Adoption of rigid-airship streamlines as model for fuselage of airplane; details of single-bay 4-place

biplane equipped with one 200-hp. Wright Tempest (E2) engine and having total wing area of 342.2 sq. ft.

Civil. British Civil Aircraft. Flight, vol. 16, no. 22, May 29, 1924, pp. 327-331, 13 figs. partly on pp. 324-325. Illustrates and describes commercial, racing, and school machines.

Climbing Time. The Climbing Ability of Airplanes (Die Steigleistungen von Flugzeugen), P. Brenner. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 7-8, Apr. 26, 1924, pp. 61-65, 3 figs. New formula for calculation of climbing time, with aid of which, with known ceiling and engine performance, theoretical climbing curve of airplane can be found.

Commercial. Airplanes for Transportation (Les avions de transport), Martinot-Lagarde. Technique Moderne, vol. 16, no. 24, Dec. 15, 1924, pp. 849-856, 7 figs. Recent progress in construction of transport airplanes.

France Develops Multi-Motored Transport Planes, L. D'Orcy. Aviation, vol. 16, no. 3, Jan. 21, 1924, pp. 60-64, 4 figs. Particulars of competition instituted by French air department in fall of 1922, with a view to developing multi-engined airplanes specially designed to answer requirements of long-distance air transport; data on Farman F3X. Farman F4S, Bleriot type 115, Breguet type 22, and Potez type 22, which were among the entries.

The "Feiro I" Commercial Monoplane. Flight, vol. 16, no. 7, Feb. 14, 1924, pp. 86-87, 3 figs. First Hungarian machine; strut-braced monoplane with wing resting on top of fuselage; 120-hp. Le Rhône rotary engine; span, 46 ft. 9 in.; length, 28 ft. 11 in.; chord, 6 ft. 7 in.; wing area, 280 sq. ft.

The Glenn L. Martin Model 70 Commercial Plane. Aviation, vol. 17, no. 5, Aug. 4, 1924, pp. 835-836, 1 fig. New ship designed for either cargo or passenger carrying, 200-hp. Wright model E 4 engine with pay-load capacity of 750 lb. and cruising range of 550 mi.

See also Civil; Fokker; German Commercial; Stout Air Pullman; Swallow; Udet.

Construction. Building Government Airplanes, F. G. Steinebach. Iron Trade Rev., vol. 74, no. 10, Mar. 6, 1924, pp. 665-670 and 673, 11 figs. Difficulties encountered; fabrication of aluminum alloys important phase of construction; seasoned organization essential. Methods employed at plant of Glenn L. Martin Co., Cleveland.

Cox-Klemin C. K. 2. The Cox-Klemin C. K. 2 Training Biplane. Flight, vol. 16, no. 2, Jan. 10, 1924, p. 17, 1 fig. Two-seater side-by-side tractor biplane for training purposes built for U. S. Army Air Service; Wright model E 190-hp. engine; span, 29 ft.; chord, 5 ft. 6 in.; stagger, 2 ft.; wing area, 293 sq. ft.; speed range, 47-125 m.p.h.

Cubaroo. See Blackburn-Napier "Cubaroo."

Curtiss. See Pursuit.

Curvilinear Flight. See FLIGHT, Curvilinear.

Czechoslovak. See Prague Show.

Daimler. The Daimler L.15. Flight, vol. 16, no. 19, May 8, 1924, pp. 263-265, 6 figs. Description of a German two-seater light plane, with motorcycle engine of 7-9 rated hp.; wing span, 41 ft. 4 in.

The German Light Airplane Daimler L15 (Das deutsche Daimler-Leichtflugzeug L15), W. v. Langsdorff. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 11-12, June 26, 1924, pp. 121-122, 4 figs. Discusses development of light airplanes with low motive power based on successes of glider planes, and describes L15 glider with 7-9 hp. motor.

See also German.

Dayton Air Meet. The Dayton Air Meet. Aviation, vol. 17, no. 15, Oct. 13, 1924. Contains following articles: Editor's Story of Dayton Air Meet, L. d'Orcy, pp. 1110-1118, 6 figs.; The Mitchell and Pulitzer Trophy Race, pp. 1118-1121, 4 figs.; My First American Air Meet, C. C. Grey, pp. 1122-1123; An Engineer's View of the Races, E. P. Warner, 1124-1126, 1 fig.; A First Impression of the Races, A. Klemin, pp. 1127-1128, 1 fig.

De Havilland. The De Havilland Type D.H.51. Flight, vol. 16, no. 28, July 10, 1924, pp. 437-440, 8 figs. Describes two-three-seater biplane of low cost and economical in running; power plant provided with either 90-hp. R.A.F. 1A or 80-hp. Renault, both 8-cylinder air-cooled engines.

Design. Airplane Construction (Betrachtungen über den Flugzeugbau), O. Mader. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 40, Oct. 4, 1924, pp. 1041-1046, 16 figs. Discusses factors governing design and describes how special problems have been solved; comparison of airplane with other forms of transportation from technical viewpoint; future prospects.

Aviation and Technology (Luftfahrt und Technik), E. Everling. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 20, May 17, 1924, pp. 491-492, 2 figs. Points out that aircraft construction may be considered as light construction, that is, it is characterized by weight economy in design, material, and power plant; applications of aircraft technology to other fields of engineering, especially to automobile construction, in which great advantages have resulted from light construction; Rumpler streamline automobile is cited as example; results for industry and academic instruction.

Structural Weight of Aircraft as Affected by the System of Design, Chas. W. Hall. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 206, Nov. 1924, 21 pp., 5 figs. Various details of design or arrangement of parts of airplane structures are shown and discussed, use of these devices having resulted in production of structures of adequate strength, yet of weight less than one-half of usual construction.

The Construction of Airplanes in France and Other Countries (La construction des avions en France et à l'Etranger), P. Grimault. Aéronautique, vol. 5, no. 55, Dec. 1923, pp. 509-516, 11 figs. Policy in France, Great Britain, United States, and Germany; commercial planes; high-speed planes; military monoplanes and biplanes; medium and large planes.

Developments. See AERONAUTICS, Developments.

Dietrich-Gobiet. The Dietrich-Gobiet Sport Monoplane. Flight, vol. 16, no. 21, May 22, 1924, pp. 286-287, 3 figs. A German "Ford of the air." Length, overall, 17 ft. 8½ in.; span, 26 ft. 3 in.; height, 6 ft. 5 in.; weight, empty, 396 lb.; useful load, 352 lb.; 30-35-hp. 2-cylinder opposed air-cooled Haacke engine.

Dornier. See Metal.

Douglas World Cruiser. The Douglas World Cruiser Described. Aviation, vol. 16, no. 8, Feb. 25, 1924, p. 205, 1 fig. Conventional-type biplanes which carry large load in proportion to their own weight, giving them a long non-stop flying range, and yet they can be maneuvered into and out of small landing areas.

Driggs-Johnson. The Driggs-Johnson Light Monoplane. Flight, vol. 16, no. 46, Nov. 13, 1924, pp. 721-722, 3 figs. See also Aviation, vol. 17, no. 20, Nov. 17, 1924, pp. 1274-1275, 3 figs. Totally-enclosed "cabin" for pilot; four-cylinder Henderson engine; top speed, 85 m.p.h.; wing span, 27 ft.; wing area, 70 sq. ft.

Economy Tests. Economy Test of the DH-4, W. F. Gerhardt and Rob. Anderson. U. S. Air Service Information Circular, vol. 5, no. 461,

April 1, 1924, 4 pp., 3 figs. Following development of satisfactory flowmeter installation for airplanes, application was made to determine economical operating conditions of DH-4; attempt to check results of previous economy tests, to ascertain effect of altitude adjustment, and to confirm theory of economical operation previously developed.

Ehrlich V. The Ehrlich V. Flight, vol. 16, no. 20, May 15, 1924, p. 277, 1 fig. Notes on a new passenger airplane produced by Zentral Aviatik & Automobil Ges. m.b.H. of Vienna; span, 32 ft. 10 in.; length, 22 ft.; wing area, 333.5 sq. ft.; 6-cylinder vertical "Hiero" engine rated at 180/200 b.hp.

Engines. See AIRPLANE ENGINES.

Falco-Dornier. See Strength Tests.

Farman. See Commercial.

Farman Goliath. The 600 hp. Single Engined Farman Goliath. Aviation, vol. 17, no. 20, Nov. 17, 1924, pp. 1276-1278, 4 figs. New engine replaces twin-engine arrangement in Goliath air liner used on Paris-London route.

Feiro. See Commercial.

Fiat. The Fiat "C.R.," "R.S." and "B.R." Biplanes. Flight, vol. 16, no. 20, May 15, 1924, pp. 273-274, 4 figs. Particulars of three Italian military machines constructed by Fiat Co., of Turin: "C.R." and "R.S.," fitted with 300-hp. Hispano-Suiza engines and "B.R." fitted with 700-hp. Fiat A-14 engine.

Fighting. See Martinsyde; Siskin.

Flap Gear. The De Havilland Automatic Flap Gear. Aeroplane, vol. 26, no. 18, Apr. 30, 1924, p. 368, 5 figs. Differs from other types in that there is no additional operating gear involved and flaps are entirely automatic in their action. Flaps are exactly like normal ailerons, except that they extend over whole span of wings. Effect on machine when this gear was fitted to a D.H.50 airplane.

Flettner Principle, Application of. The Flettner "Rotor Ship." Flight, vol. 16, no. 47, Nov. 20, 1924, p. 741, 3 figs. Discussion of whether principle of Flettner's rotor-ship, a ship which "sails without sails," is applicable to aircraft. See also How Principle of Flettner "Rotor" Can Be Tested Out in Actual Flight, in same magazine, no. 49, Dec. 4, 1924, p. 759, 3 figs.

Flexible Wings. Study of Bird Wings and Flexible Planes (Sur l'étude aérodynamique des ailes d'oiseaux et des voilures souples), E. Huguenard, A. Magnan and A. Planiol. Académie des Sciences—Comptes Rendus, vol. 178, no. 2, Jan. 7, 1924, pp. 193-196, 2 figs. Describes experimental arrangement used to measure lift-drift ratio, etc., of supple wings. See abstract in Génie Civil, vol. 84, no. 4, Jan. 26, 1924, pp. 91-22, 2 figs.

Flight of. See FLIGHT.

Flying Boats. See FLYING BOATS.

Focke-Wulf. Focke-Wulf Service Airplane, Type A-16 (Focke-Wulf-Verkehrsflugzeug Typ A. 16). Luftfahrt, vol. 28, no. 9, Aug. 5, 1924, pp. 158-160, 6 figs. 75-hp. S & H engine; accommodation for four persons.

The Focke-Wulf Cabin Plane. Aviation, vol. 17, no. 23, Dec. 8, 1924, p. 1371, 2 figs. Machine is equipped with 75-hp. Siemens-Halske engine and carries 3 passengers besides pilot; it is a cantilever monoplane with wing built in single piece; fuselage is built entirely of wood.

Fokker. The Fokker C4 Commercial Airplane. Aviation, vol. 16, no. 12, Mar. 24, 1924, p. 310, 1 fig. Adaptation of 2-seater corps observation plane; equipped with 400-hp. Liberty engine.

Wind Tunnel Test of the Fokker PW-5 With the V-40 Wing and the PW-5 Wing, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 474, Oct. 1, 1924, 18 pp., 32 figs. Design characteristics of PW-5, single-seater single-motored parasol cantilever pursuit monoplane with usual type of continuous axle landing gear and a nose radiator, and results of test to determine aerodynamic characteristics.

See also Ambulance.

Fuselage, Stresses in. A Short Method of Calculating Torsional Stresses in an Airplane Fuselage, J. E. Younger. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 203, Sept. 1924, 23 pp., 10 figs. on supp. plates. Deals with investigation carried out in Civil Engineering Laboratory of University of California, to determine accuracy of existing methods of computing stresses in airplane fuselage when subjected to torsion, and to derive simple approximate formula for rapid calculation of these stresses.

Gallaudet. Wind Tunnel Test of the Original DB-1 Model, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 475, Oct. 1, 1924, 7 pp., 10 figs. Design characteristics of original Gallaudet DB-1, a cantilever tractor monoplane, day bomber, of 750 hp., and results of test to determine aerodynamic characteristics.

German. German Light Airplanes (Deutsche Leichtflugzeuge), W. v. Langsdorff. Luftfahrt, vol. 28, no. 4, Apr. 1924, pp. 64-67, 5 figs. Structural and technical details of Daimler 7 to 9-hp. airplane and account of author's record flight with this machine.

German Commercial. Three New German Commercial Airplanes. Aviation, vol. 16, no. 6, Feb. 11, 1924, p. 155, 3 figs. Small-capacity passenger carriers with interesting features; details of Mark 4-seater; Udet 3-seater and Caspar 3-seater.

Gliders. A New Type of Glider (Ein neuartiges "Segel"-Flugzeug), R. Platz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 1-2, Jan. 26, 1924, pp. 1-2, 5 figs. Also (translation) Flight, vol. 16, no. 10, Mar. 6, 1924, pp. 125-130, 4 figs. Describes design developed by author, which combines advantages of low cost of production, collapsibility so that it can be carried in railway passenger car, easy and cheap changeability of parts, and light weight, so that it can be carried by one man, and can be put together in 10 min.; results of tests with models and with full-size plane.

Conclusions and Results of the Rhoen Glider Competition (Erfahrungen und Ergebnisse des Rhön-Wettbewerbs 1924), W. Schlink. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 21-22, Nov. 28, 1924, pp. 232-234. Among new ideas appearing are a pair of Harth machines and a Breslau machine with pivoted wings; author considers pivoted wings an important innovation which may well lead to better utilization of gusts; a few machines had "wing-end control," which is criticized as offering too much head resistance; the glider, Charlotte, has all rudder organs located at wing tips, so that tail body has been done away with entirely; two planes were equipped with changeable wing profile.

Dimensions of Gliders at the Rhön Competition 1924 (Ueber die Vermessung der Segelflüge im Rhönwettbewerb 1924). Luftfahrt, vol. 28, no. 8, Mar. 15, 1924, pp. 33-47, 16 figs. Series of articles on gliders and gliding questions, dynamic gliding, gliding at sea and over plains, construction of gliders, etc.

Gliders: Their History and Uses, W. H. Sayers. Roy. Aeronautical Soc.—Jl., vol. 28, no. 161, May 1924, pp. 315-322. Review of development and discussion of possibilities.

Technical Considerations Regarding the 5th Rhön Competition, 1924 (Technische Betrachtungen zum 5. Rhön-Segelflug-Wettbewerb 1924), R. Eisenlohr. Luftfahrt, vol. 28, no. 11, Sept. 5, 1924, pp. 185-189, 11 figs. Critical review of a

number of gliders, including Moritz, Margarete, Konsul, Espenlaub, Charlotte, etc.

The Aerodynamical and Structural Characteristics of Russian Gliders (Von den aerodynamischen und konstruktiven Eigenschaften russischer Segelflugzeuge), A. Scherschevsky. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 21-22, Nov. 28, 1924, pp. 246-248, 4 figs. Account of first all-Russian glider competition, Nov. 1-18, 1924; details and performances of competing machines.

The Airplanes of the Rhoen Glider Competition 1924 (Die Flugzeuge des Rhön-Wettbewerbes 1924), W. Coulmann. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 21-22, Nov. 28, 1924, pp. 225-232, 19 figs. Details and performances of more important competing gliders.

The Magnan Monoplane Glider. Flight, vol. 16, no. 4, Jan. 24, 1924, pp. 43-44, 3 figs. See also Aviation, vol. 16, no. 10, Mar. 10, 1924, pp. 257-258, 1 fig. Description of a French machine designed for gust-soaring, known as Type Marin M.2; span, 37 ft. 9 in.; length, 16 ft. 3 in.; chord, 4 ft. 3 in.; wing area, 110 sq. ft.

The New Gliding Plane of the Hanover Technical High School (Das neue Segelflugzeug der Technischen Hochschule Hannover), W. Günter. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 11-12, June 26, 1924, pp. 122-124, 7 figs. Details of design; gliding angle, 1:28.8; soaring speed 0.448 m. per sec.; weight, 75 kg.; width, 15 m.; bearing surface, 15 sq. m.

Gourdou-Leseurre. A Bristol "Jupiter" Makes History in France. Flight, vol. 15, no. 45, Nov. 8, 1923, pp. 681-682, 3 figs. Particulars of Gourdou-Leseurre all-metal monoplane, designed as a single-seater fighter; streamlined Bristol "Jupiter" engine; speed of 223.7 m.p.h. attained.

Guiding by Radio Signals. See DIRECTION FINDING.

Handley Page W8.F. The Handley Page W8.F. Aeroplane, vol. 26, no. 18, Apr. 30, 1924, pp. 370, 372, and 374, 8 figs. Fitted with one Rolls-Royce Eagle IX engine of 360 hp. in nose of fuselage, and two Siddeley Puma engines each of 240 hp. on wings; span, 75 ft.; length, 60 ft. 1 in.; height, 17 ft.; wing area, 1456 sq. ft.; loaded weight, 12,000 lb.; max. speed, 102 m.p.h. See also Flight, vol. 16, no. 18, May 1, 1924, pp. 248-253, 17 figs.

Hangars. See HANGARS.

Helicopters. See HELICOPTERS.

High-Speed, Development of. The Development of High-Speed Aircraft, R. Mayo. Roy. Aeronautical Soc.—Jl., vol. 28, no. 159, Mar. 1924, pp. 158-182 and (discussion) 183-188, 9 figs. Early development; Gnome engines; French ascendancy and British awakening; British research period; war period; revival of rotary engine; postwar period; beginning of American supremacy; French and British postwar efforts; high-speed seaplanes and flying boats; future prospects; value of speed races.

Holland H-1. The "Holland" Light 'Planes. Flight, vol. 16, no. 46, Nov. 13, 1924, pp. 722-724, 4 figs. Principal characteristics of Holland H-2. Description of Holland H-1, a two-seater tractor biplane, fitted with 35-hp. 3-cycle Anzani engine; span, 25 ft. 6 in.; length, 21 ft.; wing area, 150.6 sq. ft.

Huff-Daland. The Huff-Daland Petrel 4 and TW5 Airplanes. Aviation, vol. 16, no. 23, June 9, 1924, pp. 614-615, 8 figs. Details of fuselage, wings, landing gear, control surfaces, seating arrangement and power plant of Wright-engined cantilever biplanes.

Induced Drag. Induced Drag of Multiplanes, L. Prandtl. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 182, Mar. 1924, 22 pp., 8 figs. Calculation is based upon assumption that lift on wings is distributed along wing in proportion to ordinates of semi-ellipse; formulas and numerical tables are given for calculating drag; most favorable arrangements of biplanes and triplanes are discussed and results are further elucidated by means of numerical examples. Translated from Technische Berichte, vol. 3, no. 7.

Klemperer-Aachen. An Interesting German Light Monoplane, A. Martens. Flight, vol. 16, no. 8, Feb. 21, 1924, p. 108, 1 fig. Principal details of Klemperer-Aachen, having 2-cylinder air-cooled Siemens engine with rated power of 5-11 hp.; length overall, 14 ft. 9 in.; span, 42 ft. 8 in.; height, 5 ft. 11 in.; wing area, 161.5 sq. ft.; speed, 43.6 m.p.h.

Landing and Launching Device. The Gibbons Landing and Launching Device. Aviation, vol. 16, no. 12, Mar. 24, 1924, pp. 308-309. Invention to solve terminal problem of civil aviation; consists of flat, unobstructed platform made up of wood flooring on light structural steel framework; platform is pivoted transversely in center to allow it to be tilted to any desired angle and is mounted on circular track allowing it to be revolved into wind for launching or receiving of airplanes.

Lift and Drag Forces. See AIRPLANES, Wind-Tunnel Tests.

Lifting Forces. The Forces which Lift Aeroplanes, V. K. F. Bjerknes. Nature (Lond.), vol. 114, nos. 2865 and 2866, Sept. 27 and Oct. 4, 1924, pp. 472-474 and 508-510, 4 figs. Direct geometric and inverse dynamic analogy between hydrodynamic and electromagnetic fields; direct geometric analogy; theoretical airplane; automatic production of lifting circulation; induced resistance.

Light. Light Airplane Construction (Leichtbau), A. Baumann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 551-555. Deals with materials, design, stress and arrangement conducive to light-weight construction; advantages and disadvantages of light construction and useful field. See also following article, pp. 555-556, 3 figs., entitled The Selection of Materials for Light Construction (Die Frage des Baustoffes im Leichtbau), P. Meyer.

Lympne Trials of Two-Seater Light Aeroplanes. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 525-526, 4 figs. Describes winner of first prize, a monoplane, named Wee Bee I, fitted with Bristol Cherub engine, and constructed by Beardmore & Co.

Royal Aero Club Light Aeroplane Competitions, J. S. Buchanan. Roy. Aeronautical Soc.—Jl., vol. 28, no. 168, Dec. 1924, pp. 676-690 and (discussion) 691-698. Gives facts ascertained by series of competitions and review of present position, with view to considering what steps are desirable for future development.

Tendencies of Light-Airplane Construction (Richtlinien des Leichtmaschinenbaus), A. Baumann. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 3-4, Feb. 26, 1924, pp. 17-19. Discusses factors and problems underlying development of light planes. See also articles entitled The Nature of Light-Airplane Construction (Das Wesen des Leichtbaues), Geo. König, p. 20; and Light-Airplane Construction and Its Future Development (Der Leichtbau und seine Fortentwicklung), H. Seehase, pp. 20-22, 7 figs.

The Light Aeroplane, A. H. Tiltman. Automobile Engr., vol. 14, no. 197, Dec. 1924, pp. 393-397, 7 figs. Lessons of trials at Lympne, 1924; trend of design; description of individual machines.

Two-Seater Light 'Plane Competitions at Lympne. Flight, vol. 16, no. 39, Sept. 25, 1924, pp. 588-624, 95 figs. Descriptions of airplanes entered for British Air Ministry's competition,

Sept. 29-Oct. 4, 1924. See also Aeroplane, vol. 27, no. 13, Sept. 24, 1924, 14 pp. between pp. 278 and and 303, 36 figs.

Use of the Light Planes in Aeronautical Research, W. L. LePage. Aviation, vol. 17, no. 16, Oct. 20, 1924, pp. 1169-1170. Notes on obtaining experimental data; flight tests of scale models; question of weight.

See also Bristol Brownie; Caspar; German; and Pixie.

Lioré-Olivier. The New Lioré-Olivier Airplanes and Hydroplanes (Les nouveaux Avions et Hydravions Lioré-Olivier). Aérophile, vol. 32, no, 1-2, Jan. 1-15, 1924, pp. 35-37, 3 figs. Details of 3-seater bomber, 2-seater pursuit and night-observation plane, and commercial and military hydroplanes.

Longitudinal Oscillation. Longitudinal Oscillation of an Airplane, R. Fuchs and L. Hopf. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 188, Apr. 1924, 45 pp., 10 figs. Problem and method of analysis of longitudinal oscillation. Translated from Technische Berichte, vol. 3, no. 7.

Low-Powered. Low-Powered Flying, M. E. A. Wright. Instn. Aeronautical Engrs., Minutes of Proc. No. 6, 1923, pp. 23-28 and (discussion) 28-36. Performance obtainable with low-powered machines 15 years ago; development of modern low-power airplane.

Magnan. See Gliders.

Mail-Service. See Metal.

Manless. Automatically Piloted Airplanes and Guidance by Radiotelegraphy (L'avion automatique et la direction des avions par T.S.F.), P. Hémardinquer. Nature (Paris), no. 2598, Jan. 19, 1924, pp. 39-43, 9 figs. Study of practical devices employed by M. Percheron and his co-workers which brought about good results obtained in tests at Etampes.

Mark. See German Commercial.

Martin. The Martin Model 70 Commercial Biplane. Flight, vol. 16, no. 43, Oct. 23, 1924, p. 685, 1 fig. Particulars of machine designed for either cargo or passenger carrying; fitted with 200-hp. Wright model E4 engine, has speed range of 45-112 m.p.h., with pay load of 750 lb., and cruising range of 550 miles; span, 38 ft.; overall length, 27 ft.; height, 12 ft.

See also Commercial.

Martinsyde A.D.C.I. The Martinsyde A.D.C.I. Single-Seater Fighter. Flight, vol. 16, no. 48, Nov. 27, 1924, pp. 742-746, 9 figs. 380-hp. Armstrong-Siddeley "Jaguar" engine; top speed, 160 m.p.h.; length, 25 ft.; span, 32 ft. 9 in.; area of main planes, 320 sq. ft.

Materials for. See AIRCRAFT CONSTRUCTION MATERIALS.

Metal. Development and Design of Dornier Metal and All-Metal Airplanes (Entwicklung und Konstruktion der Metall- und Ganzmetallflugzeuge von Dornier), H. Werner. Motorwagen, vol. 27, no. 14, May 20, 1924, pp. 246-248, 8 figs. Comparison with development of Junkers planes.

Metal Airplane Construction (Ueber Metallflugzeugbau). Motorwagen, vol. 27, no. 11, Apr. 20, 1924, pp. 190-194. Comparisons between metal and wooden airplanes, showing advantages of former; properties of metals employed; heat treatment for annealing and for refining. Abstracted and translated into German from Russian journal, Westnik Wosduschnogo Flota.

Metal Construction for Aviation (Le costruzioni metalliche in aviazione), R. Giacomelli. Ingegneria, vol. 3, no. 10, Oct. 1, 1924, pp. 348-356, 41 figs. Discusses wing construction; all-metal construction in Germany, France and other countries, including Junkers, Dornier, Rohrbach, Levasseur, etc.

New Metal Airplane for Mail Service, F. H. Colvin. Am. Mach., vol. 60, no. 4, Jan. 24, 1924, pp. 121-124, 14 figs. Details used in construction of all-metal fuselage; methods of forming channels and other special shapes with simple equipment.

Production Airplanes of Metal, E. B. Carns. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 733-738, 12 figs. Describes construction of airplane which author claims to be a production proposition; type best suited to this is stated to be biplane, and metal the most suitable material of which to make it; covers whole construction of airplane, together with cost of its production in lots of from 1 to 10; gives lists of things to do and to avoid in constructing metal airplanes and explanation of methods used in making fittings and certain parts.

Stout All-Metal Monoplane Is Designed Specially for Commercial Use, J. E. Schipper. Automotive Industries, vol. 50, no. 18, May 1, 1924, pp. 959-961, 4 figs. Carries fuel for average flight of 4½ hr.; equipped with 400-hp. Liberty engine with speed of 110 m.p.h.; three bulkheads between passengers and power plant deaden noise.

The Brunet-Descamps A2 Airplane (L'avion Brunet-Descamps A2) Aérophile, vol. 32, no. 9-10, May 1-15, 1924, pp. 157-159, 5 fig. A reconnoitering biplane; Lorraine motor of 400 hp.; surface, 44 sq. m.; total weight, 1900 kg.; highest speed, 240 km. per hr.; constructed by Descamps.

See also AIRCRAFT, Metal Construction.

Military. British Military Aircraft. Flight, vol. 16, no. 22, May 29, 1924, pp. 306-327, 52 figs. Land machines and seaplanes designed for warlike operations.

See also Lioré-Olivier; Martinsyde; Siskin; Troop Carriers.

Model. Model Aeroplanes, W. E. Schweitzer. Armour Engr., vol. 16, no. 1, 1924, Nov. 1924, pp. 16 and 30, 1 fig. Their design and construction.

Models, Pressure Distribution on. Investigation of the Distribution of Pressure on the Body of an Airplane Model (Onderzoek van de drukverdeeling op den romp van een vliegtuigmodel). Ingenieur, vol. 39, no. 4, Jan. 26, 1924, pp. 58-63, 9 figs. Pressure is measured at various points of model by means of sensitive micrometer; results plotted in diagrams.

Monoplane Theory. Monoplane Theory, N. K. Bose. Lond., Edinburgh & Dublin Philosophical Mag. & Jl., of Sci., vol. 48, no. 283, July 1924, pp. 113-125, 1 fig. Discusses theory of circulation of liquid round airplane equal and opposite to that of vortex formed and reduces it to mathematical basis.

Naval. See AERONAUTICS, Naval.

Nieuport-Delage Type 42. The Nieuport-Delage Type 42. Flight, vol. 16, no. 30, July 24, 1924, pp. 461-462, 4 figs. Hispano-Suiza engine of twelve-cylinder V-type with bore of 140 mm. and stroke of 150 mm.; power developed, 600 hp. at 2000 r.p.m.

Observation. Notes on the Design of a Corps Observation Plane, H. F. Marshall. Aviation, vol. 16, no. 21, May 26, 1924, pp. 561-563, 2 figs. Exhaust silences is said to be desirable; cockpit arrangement; provision for overload; cruising range; landing speed; reporting on observation.

Paris Show. The Paris Aero Show, 1924. Flight, vol. 16, nos. 49, 50, 51, and 52, Dec. 4, 11, 18, and 25, 1924, pp. 753-758, 766-777, 783-791, and 791-804, 67 figs. Description of exhibits at Ninth International Aero Show in Paris. See also Aeroplane, vol. 27, nos. 24 and 25, Dec. 10 and 17, 1924, 10 pp. between pp. 533-554, and 10 pp. between 568-590, 39 figs.

Performance. Comparing the Performance of Geometrically Similar Airplanes, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 190, Apr. 1924, 27 pp. Deals with model rules relating to aeronautical problems, and shows how characteristics of one airplane can be determined from those of another of different weight or size, and of similar type.

Performance Estimation. Charts for Graphical Estimation of Airplane Performance, W. S. Diehl. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 192, 1924, 12 pp. 19 figs. Gives charts for estimating propeller diameter and efficiency, maximum speed, initial rate of climb, absolute ceiling, climb in 10 min., time to climb to any altitude, maximum speed at any altitude, and endurance.

The Logarithmic Polar Curve—Its Theory and Application to the Predetermination of Airplane Performance, V. Cronstedt. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 205, Oct. 1924, 34 pp., 14 figs. Outlines theory and shows some of possibilities of Rith method, generally known as logarithmic polar curve for predetermination of airplane performance, and also shows modifications required by more recent conceptions of performance.

Pilotless. Latest Progress in Telemechanics. Pilotless Airplanes. (Les derniers progrès de la télémécanique. L'avion sans pilote.), E. Marcotte. Arts et Métiers, vol. 77, no. 45, June 1924, pp. 201-204. Discusses progress in distance control by means of Hertzian waves, Sperry stabilizers, pilotless mail carriers, etc.

Pilotless Airplanes, E. Marcotte. Mech. Eng., vol. 46, no. 12, Dec. 1924, p. 898. Discusses recent progress in telemechanics, with particular application to problem of pilotless flight; problem of stability in air; automatic control in starting; other problems and possibilities. (Abstract.) Translated from Arts & Metiers, vol. 77, no. 45, June, 1924, p. 210.

Pixie. The Parnall "Pixie" Light 'Plane. Flight, vol. 15, no. 43, Oct. 25, 1923, pp. 653-654, 4 figs. Particulars of Pixie I, with 500 c.c. Douglas engine; wing area, 100 sq. ft.; span, 28 ft. 6 in.; and length, 18 ft.; and Pixie II, with 750 c.c. Douglas engine wing area, 60 sq. ft.; span, 17 ft. 10 in.; and length, 18 ft.

Plywood. See AIRCRAFT CONSTRUCTION MATERIALS, Plywood.

Potez. See Commercial.

Prague Show. The Third International Aero Show at Prague. Flight, vol. 16, nos. 23, 24, 25, and 26, June 5, 12, 19, and 26, 1924, pp. 356-365, 380-386, 395-401, and 408-409, 87 figs. June 5: Descriptions of Czechoslovak airplanes exhibited. June 12: Descriptions of French and German airplanes exhibited. June 19 and 26: Construction of machines that merit closer inspection. See also Aeroplane, vol. 26, no. 26, June 25, 1924, 9 pp. between pp. 544 and 562, 12 figs.

Pressure Distribution on Wings. Pressure Distribution Over the Wings of an MB-3 Airplane in Flight, F. H. Norton. U. S. Advisory Comm. for Aeronautics, Report no. 193, 1924, 17 pp. 15 figs. Investigation carried out to determine distribution of load over wings of high-speed airplane under all conditions of flight and pressure distribution, during level flight, over portions of wings in slipstream and, during violent maneuvers, over entire wing surface results obtained.

Propellers. See AIRPLANE PROPELLERS.

Pursuit. The Curtiss "P.W.8" Biplane. Flight, vol. 16, no. 45, Nov. 6, 1924, pp. 705-706, 8 figs. See also Aviation, vol. 17, no. 2, July 14, 1924, pp. 746-748, 5 figs. Describes single-seater tractor biplane of two-bay type; fitted with Curtiss D.12 (high or low compression) engine and wing radiators; span, 32 ft.; overall length, 23 ft. 1 in.; height, 9 ft. 1 in. Type in which R. L. Maughan flew from New York to San Francisco between dawn and dusk.

Two New Czecho-Slovak Pursuit Machines. Aeroplane, vol. 27, no. 19, Nov. 5, 1924, pp. 442 and 444, 3 figs. Data on single-seater pursuit machines constructed by Milos Bondy, of Prague, known as Avia B.H.17 and Avia B.H.19; both fitted with 300-hp. Hispano-Suiza engine.

See also Fokker; Lioré-Olivier; Thomas-Morse.

R.V/23. The Stahlwerk-Mark R.V/23 Commercial Monoplane. Flight, vol. 16, no. 3, Jan. 17, 1924, pp. 31-32, 3 figs. Particulars of German four-seater parasol monoplane; 100-hp. 6-cylinder-in-line Mercedes engine; span, 46 ft. 9 in.; length, 25 ft. 11 in.; wing area, 290.5 sq. ft.

Racing. Dayton Air Meet Shows Marked Progress in Civil and Commercial Flying, L. S. Gillette. Automotive Industries, vol. 51, no. 15, Oct. 9, 1924, pp. 636-639, 6 figs. Account of races and participating machines.

See also Civil.

Radio Equipment. See RADIOTELEPHONY, Airplanes.

Refueling in Flight. Practical Value of Refueling Airplanes in Flight, H. H. Arnold. Aviation, vol. 17, no. 2, July 14, 1924, pp. 750-751, 1 fig. Discusses desirability of refueling during flight from fuel-carrying planes.

Rolling Moment Due to Ailerons. The Induction Factor Used for Computing the Rolling Moment Due to the Ailerons, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 187, Apr. 1924, 5 pp., 1 fig. Induction factor is determined from result of model test, and compared with formula recently developed by author; the two results are found to be in substantial agreement.

Rotor-Winged. See Wings.

Scale Effect. The Work of the Aeronautical Research Committee's Panel on Scale Effect, W. S. Farren. Roy. Aeronautical Soc.—Jl., vol. 28, no. 164, Aug. 1924, pp. 526-544 and (discussion) 544-550, 14 figs. Discusses design panel of Aerodynamics Sub-Committee; plan underlying work from 1918 to 1924 and results.

Seaplanes. See SEAPLANES.

Sesefsky. A Roumanian Aeroplane. Flight, vol. 16, no. 1, Jan. 3, 1924, pp. 3-4, 2 figs. Describes Sesefsky tractor biplane, a military machine intended for reconnaissance work; vertical triangular fin built up of multi-ply wood integral with fuselage; 250-hp. Astra-Benz engine; speed, 115 m.p.h.; span, 41 ft. 4 in.; length, 28 ft. 2 in.; wing area, 394 sq. ft.

Siskin Fighting. The Siskin II Aeroplane and Jaguar Aero Engine. Engineering, vol. 118, no. 3078, Dec. 26, 1924, pp. 870-871, 17 figs. partly on supp. plate and p. 864. Represents type originally designed for and supplied to British Govt. and embodying experience gained with fighting machines during war and under peace conditions subsequently; single-engined tractor biplane with positive stagger to wings, and good dihedral angle; fitted with Armstrong-Siddeley Jaguar engine of 385 hp., details of which are given.

Slipstream Velocity. Investigation of Slipstream Velocity, J. W. Crowley, Jr. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 194, 1924, 7 pp. 9 figs. Results of experiments to investigate velocity of air in slipstream in horizontal and climbing flight to determine form of expression giving slipstream in terms of air speed of airplane.

Specifications. Airplane Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 458-462. Specifications for American and foreign airplanes.

Sport. New Lincoln Standard Sport Plane. Aviation, vol. 17, no. 25, Dec. 22, 1924, p. 1438, 1 fig. Single seater equipped with 35-hp. Anzani engine built to design of S. Swanson.

See also Dietrich-Gobiet.

Stability. Utilization of Laboratory Charts for Study of the Stability and Centering of Airplanes (L'Utilisation des Courbes de Laboratoire pour l'étude de la stabilité et du centrage des avions), J. Kernéis. Aérophile, vol. 32, nos. 3-4 and 5-6, Feb. 1-15 and Mar. 1-15, 1924, pp. 54-57 and 89-93, 12 figs. It is shown that with regard to stability, laboratory curves lead in very simple manner to desired result; it is essential, before using them, to change them with regard to center of gravity, which can be accomplished by aid of simple graphic method.

Statistics of Developments. Our Place in Aviation, L. T. Jones. Aviation, vol. 17, no. 26, Dec. 29, 1924, pp. 1454-1458, 17 figs. Author presents statistical information in such form that it will represent correctly present trend of development in aeronautics; engine development; French and American engines; speed, wing area, and horsepower; speed and airplane weight; future performance of racing airplanes.

Stout Air Pullman. The Stout Air Pullman. Aviation, vol. 16, no. 20, May 19, 1924, pp. 533-534, 3 figs. See also Flight, vol. 16, no. 42, Oct. 16, 1924, pp. 668-669, 2 figs. America's first all-metal commercial plane, built by Stout Metal Airplane Co., of Detroit, is 7-passenger-and-pilot cabin transport designed for air-line work; engine is standard Liberty 400-sp. model, but fitted with new intake manifold which is latest development of Air Service; equipped with new type jump-gap Delco distributing system.

Strength Tests. Static Elastic and Breaking Tests of a Falco-Dornier Airplane with a 300-Hp. Hispano-Suiza Engine (Prova statica di elasticita e rottura dell-apparecchio "Falco Dornier" con motore "Hispano Suiza" 300 HP). Note Tecniche di Aeronautica, Jan. 1924, pp. 3-13, 12 figs. Describes tests made at Pisa in Dec., 1923, and gives results obtained.

Surveying, Use in. See SURVEYING, Aerial.

Swallow. The 1924 Swallow Commercial Three-Seater. Aviation, vol. 16, no. 7, Feb. 18, 1924, p. 179, 1 fig. Machine is equipped with Curtiss OX5 engine and has desirable commercial features such as small dimensions, ease of control, low initial cost, and very low maintenance cost.

Swanson-Freeman. The Swanson-Freeman "SS 4" Two-Seater Biplane. Flight, vol. 16, no. 9, Feb. 28, 1924, p. 116, 1 fig. Also Aviation, vol. 16, no. 4, Jan. 28, 1924, pp. 93-94, 1 fig. Principal data and dimensions; length, 21 ft. 7 in.; height, 8 ft. 6 in.; span, 28 ft.; chord, 4 ft. 4 in.; 80-hp. Le Rhone engine.

TA-4. Wind Tunnel Test of the Original TA-4 With the Following Airfoils: USA-27C Large; USA-27C Small; Göttingen 387; Göttingen 255, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 455 (Appendix), Aug. 1, 1924, 14 pp. 24 figs. Design characteristics of TA-4, two-seater training cantilever monoplane, and results of test made to determine aerodynamic characteristics.

Thomas-Morse. Wind Tunnel Test of the Thomas-Morse MB-3 Airplane, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 468, June 1, 1924, 25 pp., 29 figs. Description of MB-3, single-seater pursuit biplane with 300-hp. Hispano-Suiza motor, and results of wind tunnel tests on original MB-3 and three modifications, to determine aerodynamic characteristics.

Training. Success of Boeing Naval Training Plane. Aviation, vol. 16, no. 10, Mar. 10, 1924, p. 261, 1 fig. New Wright-engined plane of 200 hp. which won Navy's training-plane competition at Pensacola naval air station.

See also Civil; Cox-Klemin; TA-4.

Triplane Tests. Triplane Tests, C. Wieselsberger. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 178, Feb. 1924, 20 pp., 18 figs. Experiments carried out in order to determine aerodynamic characteristics of various triplanes, which differed in relative positions of wings and, more especially, in relative incidence of wings (decalage), in stagger, and in shape of wing sections. Translated from Technische Berichte, vol. 3, no. 7.

Troop Carriers. The Armstrong-Whitworth "Awana" Troop-Carrier. Flight, vol. 41, no. 14, Apr. 3, 1924, pp. 187-190, 6 figs. Particulars of large biplane having two 450-hp. Napier Lion engines; span, 105 ft. 6 in.; length, 68 ft.; total loaded weight, 18,450 lb.; cabin accommodates 25 troops with their kit.

Tubing for. See AIRCRAFT CONSTRUCTION MATERIALS, Steel and Duralumin Tubing.

Udet. The New Udet Commercial Monoplane. Flight, vol. 15, no. 47, Nov. 22, 1923, pp. 709-710, 2 figs. Particulars of German three-seater of very clean design; a high-wing monoplane of streamline design; 70-hp. Siemens engine; span, 39 ft. 4 in.; length, 23 ft. 10 in.; wing area, 212 sq. ft.; maximum speed, 111.6 m.p.h.

See also German Commercial.

Vickers. See Bristol.

Vortices and Airfoil Lift. Note on Vortices and on Their Relation to the Lift of Airfoils, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 184, Mar. 1924, 15 pp., 2 figs. Discusses meaning of vortices, so often mentioned in connection with creation of lift by wings; action of wings can be more easily understood without use of vortices.

Vulture. The Vickers "Vulture" Amphibian. Flight, vol. 16, no. 13, Mar. 27, 1924, pp. 172-175, 9 figs. Particulars of flying boat with a Napier "Lion" 450-hp. engine; length, 38 ft. 2 in.; span, 49 ft.; top speed with full load and at sea level, about 104 m.p.h.; cruising speed, about 82 m.p.h.

Wind-Tunnel Tests. Tests on a Model of the D Airplane T 39 of the "Deutsche Flugzeug Werke" (German Airplane Works), W. Molthan. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 175, Jan. 1924, 23 pp., 7 figs. Results of experiments made in small wind tunnel of Göttingen laboratory. Translated from Technische Berichte, vol. 3, no. 7.

The Effect of Wind Tunnel Turbulence upon the Forces Measured on Models, W. L. LePage and J. T. Nichols. U. S. Nat. Advisory Comm. for Aeronautics, no. 191, May 1924, 11 pp., 2 figs. on supp. plates. Tests undertaken to find effect of turbulence in air stream upon lift and drag forces measured on models in 4-ft. wind tunnel at Mass. Inst. Technology; maximum lifts and minimum drags were measured on Göttingen-387 and R.A.F.-15 airfoils, minimum drag on streamlined strut, and static pressure gradients for different conditions of turbulence.

Wind Tunnel Test of CO-2A Model Airplane, C. E. Archer. U. S. Air Service Information Circular, vol. 5, no. 453, Mar. 15, 1924, 17 pp., 12 figs. Results of test to obtain full data on lift, drag, L/D, and moment curve about center of gravity for angles from below zero lift to above maximum lift (with and without tail plane and with and without elevator).

Wind Tunnel Test of Eight Model Fuselages, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 477, Oct. 1, 1924, 14 pp., 12 figs. Results of tests to determine lift and drag forces on eight models, viz., MB-3, PW-2, CO-1,

CO-2, TP-1, NBS-1, VE-7, and TW-2, at various angles of attacks and various speeds.

Wind Tunnel Test of the Original TA-4 with the Following Airfoils: USA-27C Large, USA-27C Small, Göttingen 387, and Göttingen 255, A. L. Morse. U. S. Air Service Information Circular, vol. 5, no. 455, Mar. 15, 1924, 27 pp., 31 figs. Test to determine aerodynamic characteristics.

Wind Tunnels. See WIND TUNNELS.

Wings. A Generalization of the Schukowsky Wing Model (Eine Verallgemeinerung der Schukowskyschen Flügelabbildung), A. Betz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 10, May 26, 1924, p. 100, 2 figs. Points out that by slight change in original Schukowsky method, useful profiles can be obtained.

Aerodynamic Stresses in Airplane Wings (Sur la mesure des efforts aérodynamiques supportés par la voilure d'un avion), E. Huguenard, A. Magnan and A. Planiol. Académie des Sciences—Comptes Rendus, vol. 179, no. 22, Dec. 1, 1924, pp. 1246-1248, 1 fig. Deals with an instrument for continuously measuring deformations of wings during flight and recording them by diagrams near pilot.

An Investigation of the Movements of the Points of Inflection on Beams Under Various Combinations of Loads, H. A. Sutton and J. S. Newell. U. S. Air Service Information Circular, vol. 5, no. 471, Aug. 1, 1924, 7 pp., 4 figs. Results of investigation to determine whether or not location of points of inflection on a beam changed materially under different ratios of bending load to axial load and different degrees of restraint at points of support.

Calculation of Bearing Wings in Two- and Three-Ribbed Rigid-Frame Form [Zur Berechnung freitragender Flugzeugflügel in zwei- und dreiholmiger Steifrahmenform (Vierendeel-Rostträger)], K. Thalau. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 10, May 26, 1924, pp. 103-109, 15 figs. Calculations for both two-ribbed and three-ribbed wings.

Design of Profiles for Bearing Surfaces (Zur Konstruktion von Tragflächenprofilen), W. Müller. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 3, June 1924, pp. 213-231, 13 figs. Discusses profiles deduced from circular 2-gons, Joukowsky tip profiles, and mathematical calculations connected with profile design.

Development of Influence Lines as Applied to Statically Indeterminate Airplane Beams, R. J. Minshall and F. B. Farquharson. Univ. Wash. Eng. Experiment Station—Bul., no. 25, Feb. 15, 1924, 15 pp., 22 figs. partly on supp. plates. Graphical method of obtaining these influence lines by graphical calculus, and practical application; model method.

Elements of the Wing Section Theory and of the Wing Theory, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 191, 1924, 25 pp., 4 figs. Results of theory of wings and of wing sections which are of immediate practical value; results proved and demonstrated by use of simple conceptions of "kinetic energy" and "momentum."

Experimental Results with Slotted Wings (Neuere Versuchsergebnisse mit Spaltflügeln), G. Lachmann. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 10, 15-16 and 17-18, May 26, Aug. 26 and Sept. 26, 1924, pp. 109-116, 173-176 and 181-185, 39 figs. May 26: Influence of arrangement of slots; reduction of profile resistance with normal flight; improvement of steering capacity with lower speeds. Aug. 26: Results of tests for Udet Aircraft Works at Munich-Ramersdorf; improvements in lift-drift ratio as high as 95 per cent were obtained by subdivision of wing, which corresponds to reduction in landing velocity of 30 per cent. Sept. 26: Measurements and results.

Form and Buoyancy Invariables of a Special Class of Wing Profile (Ueber die Form- und Auftriebsinvarianten für eine besondere Klasse von Flügelprofilen), W. Müller. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 5, Oct. 1924, pp. 389-404, 22 figs. Calculation of a series of forms deduced from the circular with ellipses as intermediaries.

Further Notes on the Design of Wing Spar Sections, E. P. Warner. Aviation, vol. 16, no, 14, Apr. 7, 1924, pp. 358-360, 2 figs. Supplementary to article by author in same journal, May 29, 1922, and to critical remarks by A. J. S. Pippard, July 17, 1922.

Interference of Multiplane Wings Having Elliptical Lift Distribution, H. von Sanden. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 181, Feb. 1924, 3 pp. Examination as to whether calculation of mutual induction or interference of two-wing surfaces are substantially altered by assuming elliptical instead of uniform lift distribution. Translated from Technische Berichte, vol. 3, no. 7.

Note on the Relative Effect of the Dihedral and the Sweep Back of Airplane Wings, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 177, Jan. 1924, 4 pp. It appears from investigation that effect of sweep back is always smaller than that of dihedral.

Preliminary Study of the Influence of a Rotating Cylinder on a Wing (Voorloopig onderzoek naar den invloed van een draaiende rol aangebracht in een vleugelprofiel), E. B. Wolff. Ingenieur, vol. 39, no. 49, Dec. 6, 1924, pp. 971-974, 3 figs. Investigation to ascertain whether it would be possible to obtain increased lift from airplane wing by building into its leading edge a rotating cylinder; results of wind-tunnel tests. See abstracted translation in Flight, vol. 17, no. 3, Jan. 15, 1925, pp. 30-31, 2 figs.

Proposal for Standardization of the Method of Computing Wing Sections, A. Gv. Baumhauer. Int. Aeronautics, vol. 1, no. 5, Dec. 1923-Jan. 1924, pp. 274-276 and 292, 2 figs. Report of Ryks-Studiedienst Voor de Luchtvaart, Amsterdam, Holland.

Some Experiments on the Vibration of Bars, E. F. Relf. Lond. Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 286, Oct. 1924, pp. 646-653, 3 figs. Work undertaken to throw light on questions relating to practical problem of vibration in airplane wing spars.

Turbulent Layers and Circulation (Wirbelschichten und Zirkulation), W. Müller. Zeit. für Technische Physik, vol. 5, no. 10, 1924, pp. 450-458, 7 figs. Discusses Koukowsky wing profile and theory of turbulent layers, to determine formation of eddies and circulation on wing in flight.

See also Airfoils; Biplanes; Flexible Wings; AERODYNAMICS, Lilienthal Effect.

Wood Members, Stresses in. Stresses in Wood Members Subjected to Combined Column and Beam Action, J. A. Newlin and G. W. Trayer. U. S. Nat. Advisory Comm. for Aeronautics, Report no. 188, 1924, 13 pp., 9 figs. Results of tests to determine properties of wing beams of standard and proposed sections, conducted by Forest Products Laboratory and financed by Army and Navy.

Yawing Moment, Induced. A New Relation between the Induced Yawing Moment and the Rolling Moment of an Airfoil in Straight Motion, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Report, no. 197, 1924, 5 pp., 1 fig. Computation of induced yawing moment which is said to be greatest part of entire yawing moment encountered by wings.

AIRSHIPS

AIRSHIPS

Aerodynamic Forces on Hulls. The Aerodynamic Forces on Airship Hulls, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 184, 1924, 20 pp., 4 figs. New method for making computations in connection with study of rigid airships, used in investigation of Navy's ZR-1; attempt is made to develop results from very fundamentals of mechanics, without reference to some of modern highly developed conceptions.

Aerodynamical Characteristics. The Aerodynamical Characteristics of the Airship as Deduced from Experiments on Models, with Application to Motion in a Horizontal Plane, R. Jones. Roy. Aeronautical Soc.—Jl., vol. 28, no. 158, Feb. 1924, pp. 88-150, 21 figs. Considers aerodynamic forces directly measured in wind channel, that is, forces due to translation; directs attention to examination of forces due to rotation, and to combined forces and determination of positions of equilibrium in curvilinear flight with rudders inclined at various angles; and considers distribution of normal pressures over hull and fins in steady motion.

Atmospheric Electricity, Effect on. Airship Flight and Atmospheric Electricity (Luftschiffahrt und atmosphärische Elektrizität), E. Herrera. Luftfahrt, vol. 28, no. 4, Apr. 1924, pp. 59-61, 6 figs. Study of storm hazard with regard to balloon and airship flight. Translated from Spanish.

Condensing Water in Exhaust Gas. See GASOLINE ENGINES, Water Condensation from Exhaust Gas.

Developments, 1923. See AERONAUTICS, Developments.

Dimensions and Horsepower Determination. A Method of Determining the Dimensions and Horsepower of an Airship for any Given Performance, C. P. Burgess. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 194, May 1924, 14 pp., 3 figs. on supp. plates. Method includes means for estimating changes in performance or in size when modifications or new features are introduced into design, involving increase or saving in weights, or changes in resistance or propulsive efficiency.

Dirigibles. Mooring Dirigibles at Sea. Flight, vol. 16, no. 37, Sept. 11, 1924, pp. 562-563, 2 figs. Describes experiment of anchoring rigid airship to mobile mast; "Shenandoah" was moored to "Patoka" lying in Narragansett Bay.

Forces Due to Gusts. Forces on Airships in Gusts, C. P. Burgess. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 204, 1924, 8 pp. It is shown that in determining instantaneous angle of pitch or yaw, acceleration of gust is as important as its maximum velocity; expression is obtained for this instantaneous angle in terms of speed and certain aerodynamic characteristics of airship, and of maximum velocity and acceleration of gusts, and application of expression to determination of forces on ship is illustrated by numerical examples.

Fuel Consumption. The Compensation in Weight of Fuel Consumption of Airships, G. A. Crocco. Int. Aeronautics, vol. 1, no. 5, Dec. 1923-Jan. 1924, pp. 277-278. Condensation of combustion water.

Gas Turbines for. See GAS TURBINES, Automobiles.

Hangars. See HANGARS.

Hydrogen vs. Helium for. Urges Hydrogen for Polar Flight. Aviation, vol. 16, no. 4, Jan. 28, 1924, pp. 95-96. Ralph Upson, in interview granted Detroit News, warns against inflation with non-inflammable helium and points out advantages of hydrogen over helium for polar flight of Shenandoah.

Instruments. Instruments for Navigating Dirigibles (Neuere Mittel zur Navigierung von Luftschiffen), Boykow. Luftfahrt, vol. 28, no. 14, Oct. 20, 1924, pp. 233-235, 6 figs. Particulars of navigating instruments of Z.R. 3 for measuring speed, distance and course, gyroscopic compasses, etc.

Italian. Recent Progress in Italian Airship Construction, Umberto Nobile. Aviation, vol. 16, no. 5, Feb. 4, 1924, pp. 118-122, 4 figs. The SCA, OS and PM airships; keel girder construction; power-plant arrangement; type N airship, shape of hull, and characteristics.

The Italian N-Airship (Das italienische N-Luftschiff), W. Scherz. Luftfahrt, vol. 28, no. 4, Apr. 1924, pp. 62-64, 3 figs. Structural details of airship developed by U. Nobile, with carrying capacity of 20 passengers, and equipped with three 240-hp. Maybach engines; max. speed, 100 km. per hr.

Liners. The Aerial Liner, V. C. Richmond. Birmingham Met. Soc.—Jl., vol. 8, no. 11, July 1924, pp. 497-506. Deals with post-war period; question of handling and mobility; foreign airship activities, particularly those of Germany.

Man-Driven. A Man-Driven Dirigible, U. Nobile. Aviation, vol. 12, no. 9, Sept. 1, 1924, pp. 934-936. Conclusions reached by author in regard to new machine he has in mind, which he calls "cycle-airship," in which, by means of transmission devices analogous to those of bicycles, muscular force of passengers themselves would be utilized for propulsion.

Materials for. See AIRCRAFT CONSTRUCTION MATERIALS.

Meteorological Effects on. A Detailed Consideration of the Effect of Meteorological Conditions on Airships, G. H. Scott and V. C. Richmond. Roy. Aeronautical Soc.—Jl., vol. 28, no. 159, Mar. 1924, pp. 189-221, 7 figs. Considers meteorological effects on navigation of airships, on choice of sites for aerodromes, and physical and chemical effects on airships structure.

Motors for. See GAS TURBINES, Automobiles.

Navigation. The Airship's Position (Le Point en Aéronef), L. Garin. Arts et Métiers, vol. 77, no. 44, May 1924, pp. 161-170, 5 figs. Discusses navigation charts, gives a number of curves, and develops formulas for determining position.

Pressure Distribution over Ellipsoid Surface. Remarks on the Pressure Distribution over the Surface of an Ellipsoid, Moving Translationally Through a Perfect Fluid, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 196, June 1924, 8 figs. Describes easy and convenient way to determine magnitude of velocity and of pressure at each point of surface of ellipsoid of rotation; knowledge of such pressure distribution is of great practical value for airship designer.

Pressure over Hull of Elongated. Note on the Pressure Distribution over the Hull of Elongated Airships with Circular Cross Section, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 192, May 1924, 4 pp. Note containing demonstration that pressure around circular cross section of elongated airship, plotted against diameter of symmetry, can be expected to be represented by straight line.

Rigid. The Strength of Rigid Airships, C. P. Burgess, J. C. Hunsaker, and S. Truscott. Roy. Aeronautical Soc.—Jl., vol. 28, no. 162, June 1924, pp. 327-448, 26 figs. Presents present state of our knowledge with regard to general strength of rigid airships. Strength of girders, static forces affecting longitudinal strength, aerodynamic forces, longitudinal strength, secondary stresses resulting from primary shearing forces, effect of gas pressure, effect of tension in outer cover, transverse

strength, and factors of safety and comparative strength. Bibliography.

Schütte-Lanz Light Construction. Light Construction of the Schütte-Lamz Airships (Leichtkonstruktion des Luftschiffbaus Schütte-Lanz), Gentzcke. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 9, May 15, 1924, pp. 77-95, 73 figs. Application, improvement, treatment, strength, weight and qualities of construction materials; beams and joints of metal construction; beams and joints of wood construction.

Semi-Rigid. Building a Semi-Rigid Airship, J. Younger. Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 867-872, 20 figs. Design; manufacture of gas bag; use and fabrication of duralumin; assembling articulated keel; assembling pilot car.

The Italian "N" Type Semi-Rigid Airship. Flight, vol. 16, no. 12, Mar. 20, 1924, pp. 160-161, 3 figs. Fitted with three 250-hp. engines each located in a stream-lined nacelle built up of duralumin and communicating with interior of keel; capacity, 670,700 cu. ft.; length, 347 ft. 8 in.; maximum height, 85 ft. 3 in.; maximum diameter, 64 ft.; useful load, 10.5 tons; maximum speed, 62 m.p.h.

The Italian Semi-Rigid Airship "MR." Flight, vol. 16, no. 36, Sept. 4, 1924, pp. 550-551, 2 figs. Also Aviation, vol. 17, no. 8, Aug. 25, 1924, p. 913, 1 fig. Particulars of smallest airship in world: overall length, 105 ft.; diameter, 25 ft. 6 in.; capacity, 33,900 cu. ft.; useful load, 992 lb.; speed, 40 m.p.h. May be usefully employed for short-radius scouting, experimental work, etc.

Shenandoah. Rigid Airships—United States Ship "Shenandoah," H. T. Bartlett. U. S. Naval Inst.—Proc., vol. 50, no. 2, Feb. 1924, pp. 161-172, 3 figs. Description of the Shenandoah; length, 680 ft.; diameter, 78.8 ft.; height, 96 ft.; gas capacity, 2,150,000 cu. ft.; deadweight, about 74,000 lb.; speed, about 60 m.p.h.

Speed of. Speed of Airships with Minimum Fuel Consumption (Die Geschwindigkeit geringsten Brennstoffverbrauchs bei Luftschiffen), W. Bleistein. Zeit. für Flugetechnik u. Motorluftschiffahrt, vol. 15, no. 5-6, Mar. 26, 1924, pp. 42-44, 4 figs. Critical discussion of rule-of-thumb formulas developed by Munk and described in U. S. Nat. Advisory Comm. for Aeronautics, Tech. Note no. 89.

The Influences of Speed on the Economic Aspects of Commercial Airships (Der Einfluss der Geschwindigkeit auf die Wirtschaftlichkeit der Verkehrsluftschiffe), W. Bleistein. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 20, 23, and 24, Oct. 28, Dec. 13, and 27, 1924, pp. 214-219, 262-263, and 269-275, 1 fig. Details with economic performance; maximum transport performance; radius of action; speed of minimum fuel consumption; gas consumption; size of ship; profitableness; speed and time-saving factor; length of voyage in relation to required number of ships for sustained service and in relation to operating costs; total annual expenditures; economical expenditures; economical speed; conclusions.

Stability. A Study of Static Stability of Airships, F. Rizzo. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 204, Sept. 1924, 50 pp., 19 figs. on supp. plates. Theoretical discussion, dealing with conditions of equilibrium, longitudinal stability, horizontal flight, directional stability, critical speed and discussion of reversal of controls. Experimental investigation, comprising experiments for determination of effects due to change of tail area, aspect ratio, tail form, and tail thickness.

U. S. Navy ZR-3. The Rigid Airship ZR-3, C. P. Burgess. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 4, Nov. 1924, pp. 553-572, 27 figs. Speed and endurance; description of hull longitudinal girders; types of girder construction; bow mooring gear; passenger and control car; gas cells; outer cover; provisions for cargo; power plant; fins and rudders.

V.Z.-24. The French Zodiac Dirigible "Vedette." Flight, vol. 16, no. 22, May 29, 1924, p. 300, 3 figs. Particulars of V.Z.24, airship of non-rigid type; capacity, 141,280 cu. ft.; overall length, 190 ft. 6 in.; overall diameter, 38 ft. 9 in.; weight, empty, 6670 lb.; useful load, 2944 lb.; speed range, 49.6-52.7 m.p.h.

Water Ballast, Recovery from Engine Exhaust. Condensation of Water from Engine Exhaust for Airship Ballasting, Rob. F. Gohr. U. S. Air Service Information Circular, vol. 1, no. 44, May 1, 1924, 41 pp., 30 figs. Part I: Work of Bur. of Standards; description of condensers; test results. Part II: Theory. Part III: Design and construction.

Water Recovery for Airship, H. F. Parker. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 532-535, 2 figs. Describes how total weight of airship becomes less as its flight continues, and gives details of means used to counteract this rising tendency; reviews experimental work that led to equipment of Shenandoah with water-recovery apparatus, and results following its installation.

Weather Difficulties. The Rigid Airship and the Weather, Jos. B. Anderson. U. S. Nav. Inst.—Proc., vol. 50, no. 260, Oct. 1924, pp. 1629-1645. Points out difficulties of carrying ship from hangar to field preparatory to flight; points out that efficient operation will depend upon forecasting of weather changes and taking advantage of favorable conditions and avoiding dangerous ones.

Z.R.-3. See U. S. Navy ZR-3; Zeppelin.

Zeppelin. Largest and Fastest of the Zeppelins. Sci. Am., vol. 130, no. 4, Apr. 1924, pp. 238-239, 7 figs. Particulars of new German-built airship for Navy.

The Airship ZS-3 and Prospects for Future Development of Giant Airships (Das Zeppelin-Luftschiff Z. R. 3 und die Aussichten für die weitere Entwicklung der Riesenluftschiffe), R. Conrad. Motorwagen, vol. 27, no. 26, Sept. 20, 1924, pp. 457-463, 8 figs. Tabular data of some characteristic airships; gives review of developments, and their bearing on future prospects.

The New Transatlantic Dirigible (Le nouveau dirigeable transatlantique), R. Caillol. Technique Moderne, vol. 16, no. 19, Oct. 1, 1924, pp. 645-653, 20 figs. Detailed description of dirigible constructed in Germany by Zeppelin company for United States, including frame, envelope, engines, airscrews, fuel, controls, radio equipment, etc.

The Zeppelin L.Z. 126 (Le Zeppelin L.Z. 126), M. Foerster. Bul. Technique du Bur. Veritas, vol. 6, no. 2, Feb. 1924, pp. 24-27, 7 figs. Characteristics and design; nacelles; engines; rudders; passenger and crew facilities; nautical instruments. Translated from Werft-Reederei-Hafen, Nov. 22, 1923.

Twenty-Five Years of Zeppelin Airship Construction (Fünfundzwanzig Jahre Zeppelin-Luftschiffbau), L. Dürr. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 529-537, 31 figs. Details of airship LZ 126 built by Zeppelin Co. for the United States; deals with body of ship, machinery, propellers, gasoline storage, ballast, pilot's nacelle, electric lighting, landing gear, etc.

AKRIT. See STEEL, HIGH-SPEED, Akrit.

ALARM SIGNALING

Burglar, Patents for. Indicators and Burglar and Like Alarms. Abridgments of Specifications (Lond.), Class 118 (i), Period 1916-20, 28 pp. Patents for inventions.

Fire Alarms. Modern Fire Alarms (Moderne Feuermelder), F. Linke. Gewerbefleiss, vol. 103, nos. 8 and 9, Aug. and Sept. 1924, pp. 130-134 and 151-155, 15 figs. Discusses the various systems of Siemens & Halske since 1850.

ALBERTOL. See RESINS, Albertol Synthetic.

ALCOHOL

Benzyl. See BENZYL ALCOHOL.

Catalytic Decomposition. Catalytic Decomposition of Ethyl Alcohol in the Presence of Aluminum (Décomposition catalytique de l'alcool éthylique en présence d'alumine), J. E. Goris. Chimie & Industrie, vol. 11, no. 3, Mar. 1924, pp. 449-452, 1 fig. Systematic study of influence of principal factors governing reaction, namely, temperature, velocity of discharge of liquid on catalytic agent, and concentration of alcoholic liquid.

Coke-Oven Gas as Source. Recovery of Alcohol from Coke-Oven Gas and the Reaction of Ethylene with Sulphuric Acid (Zur Frage der Alkoholgewinnung aus Kokereigasen und die Umsetzung von Aethylen mit Schwefelsäure), B. Neumann. Gas- u. Wasserfach, vol. 67, nos. 1, 2 and 5, Jan. 5, 12 and Feb. 2, 1924, pp. 1-3, 14-15 and 53-55, 5 figs. Review of previous work, together with account of experiments on absorption of pure ethylene by concentrated sulphuric acid and preparation of alcohol from product; chief difficulty in application of process lies in cost of reconcentrating diluted acid, which renders process at present uneconomic.

Molasses as Source. Alcohol from Cane Blackstraps, W. L. Owen and J. D. Bond. La. Planter & Sugar Mfr., vol. 72, no. 17, Apr. 26, 1924, pp. 332-335, 8 figs. Acidification of wort is one of the most important stages of manufacture through which molasses passes in its conversion into alcohol. Results of investigation to determine effect of acid additions.

Alcohol Yields from Molasses, H. A. Tempany. Sugar, vol. 26, no. 4, Apr. 1924, pp. 189-190. Experiments made by Dept. of Agriculture of Mauritius. Comparison of percentage composition of exhaust molasses of Mauritius with that of Hawaii and Java; determination of quantities of sucrose in suspension in form of fine grain present in samples of molasses; etc.

Production. Absolute Alcohol, Its History, Production and Control (L'alcool Absolu. Son histoire, sa fabrication, son controle), B. Piqué. Association des Chimistes—Bul., vol. 61, no. 10, Apr. 1924, pp. 386-414, 7 figs. Discusses various processes of production, including Deroy, Mariller, Berley, Coppee, Neste, Ricard, Barbet, etc.

The Manufacture of Industrial Alcohol. S. African Jl. of Industries, vol. 7, no. 1, Jan. 1924, pp. 32-35. Discusses possibilities of industry in South Africa, dealing with nature and cost of raw materials, cost of producing alcohol, denaturants, and coloring of motor fuel.

ALIGNMENT CHARTS

Construction. Building Up Alignment Charts (Der Aufbau der Leitertafeln), H. Winkel. Praktische Machinen-Konstrukteur, vol. 57, nos. 24 and 25, July 1 and 8, 1924, pp. 339-342 and 349-352, 13 figs. Logarithmic multiplication and addition; calculation of functions; technical examples.

Graphic Charts for Calculating (Graphische Rechentafeln), H. Pfieger-Haertel. Dinglers Polytechnisches Jl., vol. 339, no. 16, Aug. 1924, pp. 151-154, 8 figs. Discusses Cartesian and general alignment charts and their construction and application.

Nomographic Solutions for Engineering Formulae, H. B. Muckleston. Can. Engr., vol. 47, no. 12, Sept. 16, 1924, pp. 329-333, 8 figs. Simplified method of constructing nomographic or alignment diagrams, with explanation of principles involved; alignment nomograms merit more attention than better known Cartesian nomogram; various arrangements of scales.

The Machine Cards of the AwF (Committee on Economic Production), Introduction to Nomography (Die Maschinenkarte des AwF, eine Einführung in die Nomographie), H. Winkel. Praktische Maschinen-Konstrukteur, vol. 57, nos. 19-20 and 21, June 4 and 10, 1924, pp. 261-265 and 291-293, 14 figs. Discusses mechanical addition, substraction, multiplication, and division; use of logarithmic paper; application in calculation of rotary piston engines, to rotary machinery, and to reciprocating movement.

Electrical Applications. Recent Applications of Alignment Charts (Neuere Anwendungen der Nomographie), D. Wehage. Elektrotechnische Zeit., vol. 45, no. 49, Dec. 4, 1924, pp. 1342-1346, 2 figs. Tabulation of alignment charts published, especially on electrotechnics, giving author, title, formulas, etc.

Foundry. Use of Graphic Means for Construction and Calculation (Ueber den Gebrauch graphischer Hilfstabellen beim Konstruieren und Rechnen). Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 26, June 29, 1924, pp. 185-188, 9 figs. Discusses use of logarithmic tables, slide rules, sectional paper, sets of containers, etc.

Mathematical Principles. The Mathematical Fundamentals of Nomography (Ueber die mathematischen Grundlagen der Nomographie), L. Bieberbach. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 20, May 17, 1924, pp. 495-498, 7 figs. Mathematical principles of alignment charts in simple and somewhat more complicated cases; suggestions for further developments.

Reinforced Concrete. Nomography in Reinforced Concrete Calculation (Nomographie in der Eisenbetonrechnung), Rob. Jacki. Beton u. Eisen, vol. 23, no. 7, Apr. 5, 1924, pp. 77-82, 17 figs. It is shown how different frequently occurring calculations can be greatly accelerated with aid of alignment charts which can be easily plotted by any engineer.

Ship Steel Weights. A Steel Weight Nomogram, E. V. Telfer. Mar. Eng., vol. 29, no. 2, Dec. 1924, pp. 720-723, 4 figs. Describes nomogram worked out for British standards and practice; principle involved is said to be applicable to any others.

Surfaces and Volumes. Nomograms for Rapid Calculation of Surfaces and Volumes (Der Gebrauch von Nomogrammen zur Flächen- und Massenberechnung), J. Nemcsek. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 13, Oct. 15, 1924, pp. 294-296, 5 figs. Method for calculating surfaces of dams, cross sections of cuts, etc., based on geometric anamorphosis.

ALLOY STEELS

Boiler Plates. See BOILER PLATE, Alloy Steels for.

Brittle Range. Brittle Range in Low-Alloy Steels, M. A. Grossman. Iron Age, vol. 114, no. 3, July 17, 1924, pp. 149-151, 4 figs. Behavior of austenite during quenching and drawing a probable cause. Sensitive method of measuring change in volume.

Chrome. See CHROME STEEL.

Chrome-Nickel. See CHROME-NICKEL STEEL.

Chromium and Vanadium Determination. The Determination of Chromium and Vanadium in Alloy Steels, L. Lindemann. Metal Industry (Lond.), vol. 25, no. 18, Oct. 31, 1924, p. 431. Describes method which is founded on numerous estimations, and includes points from best of modern methods.

Cobalt Steel. See COBALT STEEL.

Copper Steel. Copper in Modern Steels, G. J. Fertig. Tech Eng. News, vol. 4, nos. 9 and 10, Mar. and Apr. 1924, pp. 352-353 and 378; and 8-9 and 30, 15 figs. Mar.: Details concerning hardness properties of copper steels. Apr.: Corrosion features of these steels.

Corrosion-and-Heat-Resistant. Alloys Resistant to Heat and Corrosion, J. H. G. Monypenny. Soc. Glass Technology—Jl., vol. 8, no. 31, Sept. 1924, pp. 150-162, 5 figs. Account of useful mechanical properties of some alloys, used for valves and other fittings for steam service and for such articles as rams, pump rods and valves for hydraulic pumps and presses, with indication as to how they may be utilized; deals principally with stainless steel.

Stainless, Non-Corrosive Alloy Steels Meet Exacting Chassis and Body Requirements. Automotive Industries, vol. 51, no. 22, Nov. 27, 1924, pp. 937-938. Abstract of booklet on non-corrosive and heat-resisting steels issued by Crucible Steel Co. of Am., in which various steels of this type manufactured by company are described and subject discussed in general way.

Development. The Development of Alloy Steels, R. Hadfield. Iron & Coal Trades Rev., vol. 108, no. 2939, June 27, 1924, pp. 1120-1122, 1 fig. Also (abstracts) Iron Trade Rev., vol. 74, no. 25, June 19, 1924, pp. 1627-1628, 1 fig, and Mech. Wld., vol. 76, no. 1968, Sept. 19, 1924, pp. 189-190. Gives comprehensive survey, largely historical, of development of alloy steels and important position they have attained in metallurgical and engineering industries.

Locomotive, Parts. Alloy Steels versus Carbon Steels for Locomotives. Ry. Engr., vol. 45, no. 533, June 1924, pp. 198-200. Review of subject of alloy steel, advantage sof "straight" carbon steels, case-hardening steel, special steels for locomotive work, and alloy-steel "defects."

Manufacture. See STEEL MANUFACTURE.

Molybdenum Steel. See MOLYBDENUM STEEL.

Nickel. See NICKEL STEEL.

Pearlite Point, Movement of. The Movement of the Pearlite Point through Nickel and Chromium (Die Verschiebung des Perlitpunktes durch Nickel und Chrom), N. H. Aall. Stahl u. Eisen, vol. 44, no. 10, Mar. 6, 1924, pp. 256-259, 10 figs. Verification of the Aall hypothesis on chrome and nickel steels; relations between pearlite line, pearlite point, and alloy content.

Silicon Steel. See SILICON STEEL.

ALLOYS

Acid Mine Water. Corrosion-Resisting Alloys for Use in Acid Mine Water, R. J. Anderson and G. M. Enos. Am. Soc. for Testing Matls.—Preprint of paper for meeting June 24-27, 1924, no. 19c, 15 pp. Importance of corrosion problem to coal-mining industry; nature of acid mine water from coal mines; typical analyses of acid mine waters from bituminous coal mines; impracticability of attempting to neutralize acid waters underground; nature of corrosion processes in mine water; results of tests carried out by U. S. Bur. Mines during past several years on corrosion of ferrous and non-ferrous materials in acid mine waters from coal mines; materials resistant to acid mine waters; some specific corrosion problems of coal-mine operator. Bibliography.

Acid-Resisting. See NITRIC ACID, Plants, Acid-Resisting Iron for.

Action of Lead on. Action of Lead Upon Alloys, Geo. A. Drysdale. Foundry, vol. 52, no. 9, May 1, 1924, pp. 349-350. Obstacles which have to be overcome in melting and production of satisfactory castings from alloys suitable for use in mine pumps and accessories.

Aluminum. See ALUMINUM ALLOYS; DURALUMIN.

Aluminum Bronze. See ALUMINUM BRONZE.

Antimony in. See ANTIMONY, Estimation in Ores and Alloys.

Bearing Metals. See BEARING METALS.

Brass. See BRASS.

British Practice. Useful New Alloys and Bronzes for Engineers, A. W. Jordon. Can. Foundryman, vol. 15, no. 3, Mar. 1924, pp. 13 and 15. British practice in engineering and foundry field.

Bronzes. See BRONZES.

Cadmium-Lead Zinc. The Cadmium-Lead-Zinc System, M. Cook. Inst. Metals—Advance paper no. 3, for meeting Mar. 12-13, 1924, 17 pp., 10 figs. Numbering of alloys; preparation of alloys and thermal method; liquidus surface; solidus; binary eutectics; region of partial miscibility; microscopic examination.

Casting Properties. Casting Properties of Iron and Metal Alloys (Giessereieigenschaften der Eisen- und Metall-Legierungen), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, no. 21, June 10, 1924, pp. 295-298, 13 figs. Discusses changes in volume during cooling, increase due to separation of graphite, etc.

Chromium. See CHROMIUM, Uses and Alloys.

Copper. See COPPER ALLOYS.

Corroded, Coatings Formed on. Coatings Formed on Corroded Metals and Alloys, G. M. Enos and R. J. Anderson. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1358-N, July 1924, 9 pp., 16 figs. As coating formed affects corrosion rate, duplicate samples of eight nonferrous alloys were placed in flowing mine water. Alloys tested were as cast or as rolled, and machined or polished. Describes tests and gives corrosion losses and appearance of samples at end of test.

Corrosion-Resistant. Corrosion-Resistant Alloys—Past, Present and Future—With Suggestions as to Future Trend, P. A. E. Armstrong. Am. Soc. for Testing Matls.—Preprint of paper for meeting June 24-27, 1924, no. 19b, 15 pp.

Symposium on Corrosion-Resistant, Heat-Resistant and Electrical-Resistance Alloys. Am. Soc. for Testing Matls.—Preprint of paper for meeting June 24-27, 1924, no. 19a, 4 pp. Contains tabulation on supplementary pages of manufacturers' data on composition and properties of the alloys.

Tabular Presentation of Chemical and Physical Properties of Corrosion-Resisting Alloys. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 79-83. Tables incorporating that part of systemized compilation made by a committee of members of Am. Soc. for Testing Matls. of available data regarding those alloys having iron, nickel or copper as predominating element and offering resistance to various destructive agencies, which is of value to chemical engineer.

Tests for Grading Corrosion-Resisting Alloys, Wm. E. Erickson and L. A. Kirst. Am. Electrochem. Soc.—Advance paper no. 27, for meeting Oct. 2-4, 1924, pp. 427-434. Results of experiments undertaken in hope of separating alloys into several groups according to their resistance to corrosion; of common metals, silicon and chromium appear to be most resistant to corrosion; addition of either or both of these elements to iron reduces corrodibility very appreciably.

See also Acid Mine Waters.

Die-Casting. See DIE CASTING, Machines, Alloys, and Dies.

Elasticity of Measurement. See METALS, Elasticity of, Measurement.

Electrical Resistance. Materials for Electric Resistances (Beiträge zur Kenntnis von Widerstandsmaterialien), Geo. Klein. Elektrotechnische Zeit., vol. 45, no. 14, Apr. 3, 1924, pp. 300-302, 3 figs. Research work with view to devising some inexpensive alloy suitable for general resistance use has led to discovery of nickel-manganese-steel combination which, with certain admixtures, has remarkable properties for such use and is very low in price; its specific resistance is 0.70 ohms per sq. cm. and its cost is one-sixth that of chromium-nickel alloy; it melts at 1250 dec. cent. and permits therefore very high specific load without being subject to undue oxidation.

Some Electrical Properties of High-Resistance Alloys, M. A. Hunter and A. Jones. Am. Soc. for Testing Matls: Preprint of paper for meeting June 24-27, 1924, no. 18m, 16 pp., 4 figs. Theoretical considerations; materials used for high-resistance alloys; thermal electromotive forces of alloys.

See also ALLOYS, Corrosion Resistant.

Ferro. See FERROALLOYS.

Fusible. Properties of Fusible Alloys, N. F. Budgen. Chem. & Industry, vol. 43, no. 27, July 4, 1924, pp. 200T-203T, 2 figs. Discusses properties of lead, bismuth, tin, cadmium, and mercury, used for fusible plugs in automatic fire-extinguisher systems, also manufacture of small statuary, etc.

Gun Metal. See GUN METAL.

Heat Conductivity. See METALS, Heat Conductivity.

Heat of Formation. Heat of Formation of Inter-Metallic Compounds (Ueber die Bildungswärmen intermetallischer Verbindungen), W. Biltz and H. Pieper W. Wagner. Zeit. für anorganische u. allgemeine Chemie, vol. 134, no. 1, Mar. 29, 1924, pp. 1-36, 1 fig. Series of articles dealing with calcium alloys, cerium alloys, cobalt-aluminum alloys and copper alloys.

Iron. See IRON ALLOYS.

Lead. See LEAD ALLOYS.

Light. Light Alloys, J. B. Swan. Automobile Engr., vol. 14, no. 194, Oct. 1924, pp. 293-300, 9 figs. General survey of modern practice; parts of automobile suitable for light-alloy castings; magnesium alloys; casting alloys suitable for stock loading; piston alloys; alloys suitable for forging purposes; duralumin magnalite; aluminum as bearing metal; light alloys and hardness; Air Board, U. S. Navy and other alloys.

Light Alloys for Pistons and Connecting-Rods, L. Aitchison. Automobile Engr., vol. 14, no. 189, May 1924, pp. 148-155, 5 figs. Discusses advantages and disadvantages of light alloys for automobile-engine pistons and connecting rods.

Light Metals in Alloys (Die Leichtmetalle in Legierungen), F. Regelsberger. Zeit. für angewandte Chemie, vol. 37, no. 17, Apr. 24, 1924, pp. 235-239. Discusses alloys of light metals with others and how properties of both classes are affected by alloying, especially alkali metals, magnesium, beryllium, aluminum, etc.

Recent Progress in Light Alloys (Les alliages légers. leurs récents progrés), L. Guillet. Revue Universelle des Mines, vol. 67, no. 1, Apr. 1, 1924, pp. 7-36, 14 figs. Examination of alloys of aluminum and magnesium, their properties, influence of impurities, etc.

See also ALUMINUM ALLOYS.

Light Metals. AIRCRAFT CONSTRUCTION MATERIALS, Light Metals.

Magnesium. See MAGNESIUM ALLOYS.

Monel Metal. See MONEL METAL.

Nickel. See NICKEL ALLOYS.

Nickel Silver. See NICKEL SILVER.

Non-Ferrous. Non-Ferrous Alloys in Marine Engineering—with Special Reference to Admiralty Gunmetal, Manganese Brass, and White Metals, A. E. Logan. Foundry Trade Jl., vol. 29, nos. 408 and 410, June 12 and 26, 1924, pp. 486-492 and (discussion) 550-552, 18 figs. Equilibrium diagram of copper-tin alloys; casting temperature; structure; heat treatment.

The Practical Value of Modern Non-Ferrous Alloys, S. F. Barclay. Foundry Trade Jl., vol. 29, no. 389, Jan. 31, 1924, pp. 85-87, 1 fig. Shows that if founder is to give best service to his customers he needs to know exact use to which his castings will be put, so that he can bring out relevant quality in highest degrees; discusses different alloys.

See also NON-FERROUS METALS.

Non-Ferrous, Contraction. Contraction and Shrinkage of Non-Ferrous Alloys, Rob. J. Anderson. Tech. Eng. News, vol. 4, no. 7, Jan. 1924, pp. 258, 294, 296, and 298. Notes on liquid, solidification, and solid shrinkage; linear contraction; factors affecting contraction of alloy on casting.

Non-Ferrous, Effect of Casting Temperatures. The Effect of Casting Temperatures on the Physical Properties of Non-Ferrous Alloys. Metal Industry (Lond.), vol. 25, no. 21, Nov. 21, 1924, pp. 498-500, 4 figs. Discussion at West Yorkshire Met. Soc.

Preparation. The Preparation of Pure Alloys, R. F. Mehl. Am. Electrochem Soc.—Advance paper no. 2, for meeting Oct. 2-4, 1924, pp. 9-36, 6 figs. Discusses metallographic data, with particular reference to effect of impurities upon electrical measurements; contamination; preparation of pure basic oxide crucibles; new method of making pure magnesia crucibles of high strength and density, for use up to 1200 deg. cent.; describes combined furnace and casting apparatus for preparation of very pure alloys in a form suitable for measurement of electrical properties; methods for measurement of thermoelectromotive force and temperature coefficient of resistance of aluminum-magnesium alloys; results of preliminary measurements of temperature coefficient of resistance and of thermoelectromotive force and its temperature coefficient, upon certain compositions of system Al-Mg.

Separation. Progress in Separation of Alloys Containing Precious Metals (Fortschritte in der Scheidung edelmetallhaltiger Legierungen), G. Eger. Zeit. für angewandte Chemie, vol. 37, no. 11, Mar. 13, 1924, pp. 137-144, 16 figs. Discusses electrolytic separation process for production of gold, silver, etc., in binary and ternary alloys; refining of gold; etc.

Silver. Equilibria between Sulphur and Metal Pairs in Ternary Alloys (Gleichgewichte zwischen Metallpaaren und Schwefel), E. Lüder. Metall u. Erz, vol. 21, no. 4, 2nd Feb. issue, 1924, pp. 65-69, 7 figs. The ternary system silver-iron-sulphur.

The Ternary System Silver-Copper-Iron (Das Dreistoff-System Silber-Kupfer-Eisen), E. Lüder. Zeit. für Metallkunde, vol. 16, no. 2, Feb. 1924, pp. 61-62, 2 figs. Limited solubility of the metals, silver, copper, and iron in liquid state; slight solubility of three components in solid state; solidification processes.

Structural Composition, Determination of. Determination of Structural Composition of Alloys by a Metallographic Planimeter, E. P. Polushkin. Am. Inst. Min. & Met. Engrs.—Trans., no. 1387-E, Dec. 1924, 19 pp., 11 figs. Shows that structural composition of alloy may be found by planimetric measurement of total area occupied by each of constituents on a few representative photomicrographs of this alloy; when area is determined, volume and proportional weight of constituent may be calculated; method has been used for determina-

tion of structural composition for binary eutectics and other binary alloys with known constituents; also composition of unknown constituents in binary alloys.

Tin. See TIN ALLOYS.

ALPAX. See ALUMINUM ALLOYS, Alpax.

ALTERNATORS. See ELECTRIC GENERATORS. A. C.; TURBO-ALTERNATORS.

ALUDUR. See ALUMINUM ALLOYS, Aludur.

ALUM

Manufacture. Cutting Cost with Continuous Operation, G. E. Walker. Chem. & Met. Eng., vol. 31, no. 20, Nov. 17, 1924, pp. 776-780, 8 figs. Manufacture of alum simplified and cheapened and product improved by applying modern operating methods.

ALUMINA

Precipitates. Constitution and Evolution of Precipitates of Alumina (Constitution et évolution des précipités d'alumine), P. Pascal. Académie des Sciences—Comptes Rendus, vol. 178, no. 5, Jan. 28, 1924, pp. 481-483. From measurements of magnetic susceptibilities of specimens of alumina precipitated under various conditions, author concludes that precipitate (a gel) formed by addition of aqueous ammonia to aluminum salt consists originally of anhydrous alumina, which at length is converted into hydrate, $Al_2O_3\ 3H_2O$; this is unstable and not identical with crystalline hydrate.

ALUMINUM

[See also NON-FERROUS METALS.]

Alkali Determination in. Determination of Alkali Metals in Aluminum and Its Alloys (Alkalibestimmung in Aluminium und Aluminiumlegierungen), Schürmann and Schob. Chemiker-Zeitung, vol. 48, no. 23-24, Feb. 23, 1924, pp. 97-98. Describes method which is suitable for separation of small quantities of lithium from large amounts of aluminum.

Analysis. Aluminum in Alloys, D. H. Brophy. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, p. 963. Simple and rapid method for analysis of aluminum.

Annealing. Soft Annealing of Aluminum (Das Weichglühen von Aluminium), H. Röhrig. Zeit. für Metallkunde, vol. 16, no. 7, July 1924, pp. 265-270, 10 figs. Discusses aluminum sheets, determination of relation between degree and velocity of becoming soft, and duration, temperature, and strength of heat transmission; also tensile strength, elasticity, and size of grain.

Bauxite. See BAUXITE.

Carbon Determination in. The Determination of Carbon in Aluminum (Die Bestimmung des Kohlenstoffs im Aluminium), R. Hahn. Zeit. für Metallkunde, vol. 16, no. 2, Feb. 1924, pp. 59-60. Also (abstract) Metal Industry (N. Y.), vol. 22, no. 8, Aug. 1924, pp. 318-319. Comparison of well-known methods of determination shows that best method entails combustion of metal with help of oxidizing reagent.

Castings. Aluminum Castings, C. Dicken. Foundry Trade Jl., vol. 30, no. 432, Nov. 27, 1924, pp. 466-468 including discussion. Selection of metal; melting details; temperature; patterns; running; molding; blow-holes.

Casting Aluminum Cycle Parts, H. R. Simonds. Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 661-664, 8 figs. Congested condition of streets in business sections of cities has opened new fields for motorcycle. Many parts being made of aluminum to secure lightness. Notes on methods employed by Springfield Malleable Iron Co., Springfield, Mass., in modern aluminum and brass foundry recently started to care for increased demands for aluminum alloy castings and other nonferrous foundry business.

The Production of Aluminum Castings (Die Herstellung von Aluminiumguss), von Zeerleder. Metall u. Erz, vol. 21, no. 5, 1st Mar. issue, 1924, pp. 99-101. Describes recommendable working methods in aluminum foundries; melting arrangements; treatment of metal and production of molds.

Cerium, Influence. The Influence of Cerium on Aluminum (Der Einfluss des Cers auf Aluminium), K. L. Meissner. Metall u. Erz., vol. 21, no. 3, 1st Feb. issue, 1924, pp. 41-44. Critical discussion of previous investigations, and results of author's own investigations.

Chemical Agents, Effect of. Experiences with Aluminum in the Chemical Industry (Erfahrungen mit Aluminium in der chemischen Industries). Chemiker-Zeitung, vol. 48, no. 149, Dec. 11, 1924, pp. 921-922. Replies to questionnaire sent to various manufacturing firms giving effect of various agents on aluminum.

Chemical Industries, Use in. Experiences with Aluminum as a Material of Construction in Chemical Engineering Industries. Chem. & Met. Eng., vol. 30, no. 26, June 30, 1924, pp. 1022-1025. Results of questionnaire of German Met. Assn. show metal's advantages and limitations in wide variety of industrial equipment. Translated from Chemiker-Zeitung, vol. 16, Feb. 6 and 20, 1924, pp. 65 and 89.

Commercial Aspect. Case of Aluminum: The Commercial Aspect, Rob. J. Anderson. Brass World, vol. 20, no. 12, Dec. 1924, pp. 413-415. Foreign outlook; production, imports and exports; aluminum industry in 1923, in America and foreign countries.

Conductors. See ELECTRIC CONDUCTORS, Aluminum.

Corrosion. Recent Observations Regarding the Corrosion, Cleansing, and Protection of Aluminum, H. A. Gardner. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 206-207 and (discussion) 202, 2 figs. Experimental investigations; cleansers for aluminum alloys; gives table of results of corrosion tests on aluminum and aluminum alloys.

Electric Conductivity. Electrical Conductivity of Commercial Aluminum (Conductibilité électrique de l'aluminium commercial), L. Guillet. Revue de Métallurgie, vol. 21, no. 1, Jan. 1924, pp. 12-17, 5 figs. Influence of impurities and treatments; tests on cast, rolled, and drawn metal.

Electrical Equipment. The Use of Aluminum in Electrical Equipment (Emploi de l'aluminium dans la construction électrique), M. Dusaugey. Revue Universelle des Mines, vol. 67, no. 6, Mar. 15, 1924, pp. 362-372. Technical and economic comparison of aluminum and copper; technical qualities of aluminum; aluminum-steel cables; use of aluminum in electrical apparatus; standardization.

Foundry Practice and Working. Aluminum and Its Alloys. Metal Industry (Lond.), vol. 25, nos. 15, 18, and 20, Oct. 10, 31, and Nov. 14, 1924, pp. 351-353, 421-422, 4 figs., and 475-476, 3 figs. Oct. 10: Aluminum foundry practice. Oct. 31: Working of aluminum. Nov. 14: Corrosion and protection of aluminum.

Furnaces for Melting. See FURNACES, METALLURGICAL, Aluminum-Melting.

German Industry. Development of Aluminum Industry in Germany (Ueber die Entwicklung der Aluminiumindustrie in Deutschland), H. Specketer. Zeit. für angewandte Chemie, vol. 37, no. 27, June 25, 1924, pp. 447-451. Details of development arising from war and activity of works at Rummelsburg, Horrem, Bitterfeld, and Lauta.

Melted, Radiation Emission of. Radiation Emission of Melted Aluminum (Ueber die Strahlungsemission des geschmolzenen Aluminiums), M. Moeller and H. Miething. Giesserei-Zeitung, vol. 21, no. 20, Oct. 15, 1924, pp. 444-446, 3 figs. Discusses measurement of capacity of emission of a surface of melted aluminum at 700-1000 deg. exposed to free air at $\lambda = 0.65\ \mu$.

Melting, Use of Fluxes in. The Use of Fluxes in the Melting of Aluminum and its Alloys, W. Rosenhain and S. L. Archbutt. Foundry Trade Jl., vol. 29, no. 405, May 22, 1924, pp. 427-428. Paper read at symposium arranged by Faraday Soc., Inst. Metals, Inst. British Foundrymen, and Non-Ferrous Research Assn.

Metallurgy. The Metallurgy of Aluminum, F. A. Livermore. Foundry Trade Jl., vol. 30, nos. 417, 419, 420, 423, and 425, Aug. 14, 28, Sept. 4, 25, and Oct. 2, 1924, pp. 163-166, 187-189, 205-206, 265-267, and 311-313, 13 figs. Occurrence; natural compounds, including bauxite, cryolite, corundum, aluminum sulphate, etc.; chemical and electrochemical methods of production; physical and chemical properties; alloys; care of crucibles; melting conditions and melting furnaces.

Oxide. See ALUMINUM OXIDE, Production from Clay.

Oxy-Acetylene Welding. See OXY-ACETYLENE WELDING, Aluminum.

Paints. See PAINTS, Aluminum.

Powders, Manufacture. The Manufacture of High Grade Aluminum and Bronze Powders, O. Smalley. Metal Industry (Lond.), vol. 24, nos. 12, 13, 19, 21, and 24, and vol. 25, nos. 8 and 16, Mar. 21, 18, May 9, 23, June 13, Aug. 22, and Oct. 17, 1924, pp. 273-274, 297-298, 445-446, 493-494, 569-570, 169-170, and 369-371, 5 figs. Manufacture of powders; problems in selection of raw materials and their treatment and preparation in case of "silver" or aluminum powders; stamping operation; function of grease; polishing; dyeing or coloring; etc.

Production. Aluminum, Its Production and Use (Aluminium, seine Erzeugung und Verwendung), K. Arndt. Elektrotechnische Zeit., special no., Aug. 28, 1924, pp. 2-6, 8 figs. Discusses history of aluminum, processes of production from bauxite, electrolysis of cryolite-alumina, aluminum alloys, etc.

Properties. Investigations of the Properties of Aluminum (Recherches faites au Laboratoire central d'Electricité sur les propriétés de l'aluminium), M. Jouaust. Société Française des Electriciens—Bul., vol. 3, no. 30, Dec. 1923, pp. 663-669. Results of investigations carried out at Central Laboratory of Electricity on samples of French, American, and English aluminum.

The Influence of Cadmium Upon the Mechanical Properties of Aluminum, N. F. Budgen. Metal Industry (Lond.), vol. 25, nos. 7 and 8, Aug. 15 and 22, 1924, pp. 145-147 and 172-174, 8 figs. From results of investigations it appears that cadmium has no beneficial influence on aluminum and is not comparable with zinc in this respect. Moreover, addition of cadmium to "burnt" aluminum has no recuperative effect.

Protective Coatings for. Protective Coatings for Aluminum, C. Commentz. Chem. & Met. Eng., vol. 31, no. 18, Nov. 3, 1924, p. 698, 1 fig. Two new electrical methods developed in Germany for providing aluminum articles with anti-corrosion oxide coatings.

Recrystallization Phenomena. Recrystallization Phenomena in Aluminum, E. Wetzel. Brass Wld., vol. 20, no. 10, Oct. 1924, pp. 335-337. Discusses coarse recrystallization due to overheating, coarse recrystallization following small deformation prior to anneal, and differential grain growth due to unequal deformation followed by anneal. Abridgement of paper before committee of German Met. Soc., translated from German.

Silicon and Iron in. Effect of Silicon and Iron on the Properties of Aluminum (Der Einfluss von Silizium und Eisen auf die Eigenschaften des Aluminiums), J. Czochralski. Zeit. für Metallkunde, vol. 16, no. 5, May 1924, pp. 162-173, 36 figs. Research work by committee of German Soc. of Metallography; discusses metallographic and mechanical examination of aluminum samples of different content of iron silicide and silicon eutectic; irregular distribution, capacity for rolling, etc.

Sodium in Determination of. The Determination of Sodium in Aluminum, D. M. Fairlie and G. B. Brook. Inst. of Metals—Advance paper no. 5, for meeting Sept. 8-11, 1924, 7 pp. Describes process evolved by authors which might be relied on to separate large percentages of sodium from aluminum with reasonable accuracy and which is comparatively simple to carry out.

Soldering. Aluminum Solder (Zur Frage des Aluminiumlotes), L. Rostosky. Zeit. für Metallkunde, vol. 16, no. 9, Sept. 1924, pp. 359-361. Discusses hard and soft soldering; progress in aluminum soldering and requirements of a good aluminum solder.

Can Aluminum Be Soldered? (1st Aluminium lötbar), F. Roberti. Automobil-Rundschau, vol. 23, no. 2, Feb. 1924, pp. 17-18, 4 figs. Describes aluminum soldering process, known as Conti process, which is result of many years' experimentation in special field of homogeneous aluminum jointing; examples are cited showing advantages of process.

Processes for Combining Aluminum with Aluminum and Other Metals (Verfahren zur Verbindung von Aluminium mit Aluminium und andaren Metallen. Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 21, May 24, 1924, pp. 57-58 (Metall). Discusses soft-soldering, autogeneous welding, and hard-soldering processes, their advantages and drawbacks.

Soldering Aluminum, O. Spengler. Chem. Age (N. Y.), vol. 32, no. 9, Sept. 1924, p. 366. Results obtained in Germany with material with trade name of Sudal 21; microscopic examination has shown that by use of this flux a perfect joint of solder and of aluminum is attained. (Abstract.) Translated from Zeit. für angewandte Chemie, 1924, p. 532. See reference to article by O. Bauer (Zeit. für Metallkunde) in Eng. Index 1923, p. 607.

Some Practical Notes on Jointing Aluminum. Mech. Wld., vol. 75, nos. 1949 and 1953, and vol. 76, nos. 1957 and 1959, May 9, June 6, July 4 and 18, 1924, pp. 295-296, 356-357, 7, and 39-40. Soldering of and solders for aluminum; soldering fluxes; oxy-acetylene and electric welding of aluminum; riveting of aluminum; etc.

Specific Heat. See METALS, Specific Heats.

Substitute for. Magnesium Alloy a Substitute for Aluminum. Can. Foundryman, vol. 15, no. 6, June 1924, pp. 22-23. Castings are stronger and lighter; easily machined and polished; proof against alkalies but not acids, reverse of aluminum; manganese deoxidizer of copper.

Tensile Strength. The Tensile Properties of Aluminum at High Temperatures, Thos. Martin. Inst. Metals—Advance paper no. 10, for meeting Mar. 12-13, 1924, 32 pp., 18 pp. Examination of tensile strength at all temperatures up to neighborhood of melting point of metal in its fully annealed state; tests on commercial metal; comparison of results with those for pure metal; practical significance of results.

Thin Plates, Thermal Tests of. Thermal Tests for Aluminum Thin Plate in Test Tubes (Thermische Proben für Aluminium-Dünnblech im Reagenzrohr), F. Mylius. Zeit. für Metallkunde,

vol. 16, no. 3, Mar. 1924, pp. 81-90, 4 figs. Extension of method of deep-etch test to classification of aluminum through flat-etch test; corrosion; elasticity test; thermal soda test; protective layers on aluminum; testing of protective layers.

Uses. Aluminum and Its Applications (L'Aluminium et ses applications), M. L. Guillet. Société Industrielle de Mulhouse—Bul., vol. 90, no. 6, June-Aug. 1924, pp. 454-470. Discusses method of manufacture from bauxite, properties and impurities of aluminum, its uses and alloys, duraluminum, alpax.

Aluminum and Its Applications in the Electric Industry (L'aluminium et ses applications dans l'industrie électrique), Ph. Ouspensky. Association des Ingénieurs Sortis des Ecoles Spéciales de Gand—Annales, vol. 14, no. 3, 1924, pp. 241-286. Principle of manufacturing process, physical and chemical properties, aluminum alloys; requirements of aluminum electric conductors and general principles to be observed in using them, aluminum conductors with steel cores, comparison of aluminum and copper cables; other applications of aluminum.

Field of Application of Aluminum With Special Reference to the Chemical Industry (Verwendungsgebiete des Aluminiums unter besonderer Berücksichtigung der chemischen Industrie). Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 45, Nov. 9, 1924, pp. 357-358. Application of aluminum as a highly acid resistant light metal; other properties of aluminum; Nitorit process by means of which an exceptionally pure aluminum can be produced.

Occurrence, Production, Properties and Uses of Aluminum in Electrotechnical Industries (Vorkommen, Gewinnung, Eigenschaften und Verwendung des Aluminiums in der Elektrotechnik), W. Wunder. Elektrotechnische Zeit., vol. 45, no. 42, Oct. 16, 1924, pp. 1109-1115, 24 figs. Use of pure aluminum and of aluminum alloys in overhead lines, motors and generators, transformers, cables, switch plants, etc.

Use of Aluminum in Electrical Industries (Verwendung von Aluminium in der Elektrotechnik), W. Wunder. Elektrotechnische Zeit., special no., Aug. 28, 1924, pp. 9-10, 5 figs. Discusses application of aluminum and aluminum alloys in motors, dynamos, transformers, cables, etc.

Welding. Aluminum Welding, How and Why, S. W. Henderson. Welding Engr., vol. 9, no. 12, Dec. 1924, pp. 21-22. Points to be observed for success in this process.

Gas Welding of Aluminum, S. W. Miller. Can. Machy., vol. 32, no. 6, Aug. 7, 1924, pp. 33-34 and 50. Discusses porosity in weld, aluminum brittle, character of flame, preheating casting, manipulation of welding rod, and welding sheet aluminum.

Soldering, Welding and Riveting of Aluminum (Löten, Schweissen, Nieten von Aluminium), H. Buschlinger. Praktische Maschinen-Konstrukteur, vol. 57, nos. 35 and 36, Sept. 16 and 23, 1924, pp. 481-482 and 492-495. Discusses most favorable conditions and gives suggestions for effective operation. Welding of aluminum castings.

The Fusion Welding of Aluminum, C. F. Nagle, Jr. Am. Welding Soc.—Jl., vol. 3, no. 3, Mar. 1924, pp. 35-44. Physical laws and fundamental principles involved.

See also ELECTRIC WELDING, RESISTANCE, Spot; OXY-ACETYLENE WELDING, Aluminum.

ALUMINUM ALLOYS

[See also AIRCRAFT CONSTRUCTION MATERIALS, Light Metals; ALLOYS, Light.]

Airplane Structural Work. Data on Aluminum Alloys for Airplane Structural Work, Fred H. Colvin. Am. Mach., vol. 60, no. 7, Feb. 14, 1924, pp. 235-238, 9 figs. Standardizing channels, struts and other parts for construction of all-metal planes, even in small quantities; sizes and strength of rivets; distribution of weight.

Alpax. Apply Patented Casting Metal, R. De Fleury. Foundry, vol. 52, no. 7, Apr. 1, 1924, pp. 263-266. Properties and field of application of new alloy known as alpax, which is used for many automobile parts in France; claimed to have properties superior to usual foundry aluminum alloys; results of tests. Annual exchange paper of Assn. Technique de Fonderie of France submitted to Am. Foundrymen's Assn.

Aludur. Aludur (Aludur), K. Hallmann. Zeit. für Metallkunde, vol. 16, no. 11, Nov. 1924, pp. 433-435. Also Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1084-1085. Aludur metals are refined light aluminum alloys; basic metal is at least 99 per cent pure aluminum; describes different kinds of aludur, their properties and useful applications.

Aluminum Bronze. See ALUMINUM BRONZE.

Aluminum Copper. Heat Treatment of Aluminum-Copper Alloys, A. Portevin and F. Le Chatelier. Am. Soc. Steel Treating.—Trans., vol. 5, no. 5, May 1924, pp. 457-478, 14 figs. Study of properties of light aluminum alloys containing varying proportions of copper, manganese, and magnesium; characteristics of alloys containing copper, with and without magnesium; heat treatment and aging, and their effect upon physical properties; hypotheses explaining constitution of aluminum-copper-manganese-magnesium alloys.

The Aluminum-Copper Alloys. Alloys of Intermediate Composition, D. Stockdale. Inst. Metals—Advance paper no. 13, for meeting Mar. 12-13, 1924, 16 pp., 4 figs. Study of alloys by thermal and photomicrographic methods; results show that their behavior is even more complex than has been thought, and it is probable that diagram here put forward is only approximately correct.

The Heat Treatment for Light Alloys of Aluminum with Copper Base (Le traitement thermique des alliages légers d'aluminium à base de cuivre), A. Portevin and F. Le Chatelier. Revue de Métallurgie, vol. 21, no. 4, Apr. 1924, pp. 233-246, 14 figs. Gives characteristics of alloys containing magnesium and those containing no magnesium, and describes new process of heat-treating alloys without magnesium; influence of hardening temperature; mechanical properties of alloys, etc.; summary of advantages of alloy without magnesium. Bibliography.

Aluminum-Copper-Magnesium. Casting and Heat Treatment of Some Aluminum-Copper-Magnesium Alloys, S. Daniels and J. B. Johnson. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1350-N, July 1924, 22 pp., 6 figs. Deals with portion of work of Material Section, Engineering Division, Air Service, U.S.A., on casting and extended heat treatment of alloys of duralumin type (copper 2.5-5.0 per cent, magnesium 0.0-1.0 per cent, silicon 0.2-1.0 per cent, iron 0.3-1.5 per cent, manganese 0.0 to 1.0 per cent, chromium, etc.). This range of compositions includes an alloy recently placed on market in cast form and designated as Lynite 195.

Aluminum-Copper-Tellurium. Properties and Structure of Some Alloys of Aluminum-Copper-Tellurium, F. T. Sisco and M. R. Whitmore. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 838-841, 11 figs. Result of exploratory investigation on alloys of aluminum containing 5 per cent copper to which tellurium has been added in amounts from 0.25 to 5 per cent; physical properties of these alloys, and effect of tellurium on microstructure of aluminum; method of analysis for alloys.

Aluminum-Silicon. Aluminium-Silicon Alloys, J. B. Swan. Automobile Engr., vol. 14, no. 188, Apr. 1924, pp. 102-105, 10 figs. Their properties and

ALUMINUM ALLOYS

limitations; aluminum-silicon binary system; making up and casting alloy; reversion; aluminum-silicon as forging and cold-worked metal; effects of heat treatment.

The New Aluminum-Silicon Alloys, J. D. Edwards and R. S. Archer. Chem. & Met. Eng., vol. 31, no. 13, Sept. 29, 1924, pp. 504-508, 8 figs. Pacz' process of "modification" and remarkable improvement in properties it brings about.

Aluminum-Zinc. Behavior of Aluminum-Zinc Alloys (Das Verhalten der Aluminium-Zinklegierungen), O. Bauer and W. Heidenhain. Zeit. für Metallkunde, vol. 16, no. 6, June 1924, pp. 221-228, 9 figs. Critical review of latest work on solidification and transformation of total shrinkage, resistance to shock and behavior in attack by acids, etc.; limits of range of instability of aluminum-zinc alloys, etc.

Studies in the Aluminium-Zinc System, T. Tanabe. Inst. of Metals—Advance paper no. 13, for meeting Sept. 8-11, 1924, 38 pp., 32 figs. partly on supp. plate. Describes investigation made to confirm new diagram of Hanson and Gayler, and to make clear nature of age-hardening. Mechanical properties also studied.

The Mechanical Properties of Aluminium-Zinc Alloys Containing Cadmium, N. F. Budgen. Chemistry & Industry, vol. 43, no. 33, Aug. 15, 1924, pp. 273T-276T. Range of alloys examined includes mixtures containing from 0 to 24 per cent Zn, 0 to 10 per cent Cd, and 66 to 100 per cent Al; from certain alloys containing 10 per cent Cd, small beads of more fusible constituent exude from surface after chill casting; under hammer all specimens cracked badly above 250 deg., but those containing less than total of 18 per cent Zn + Cd forged well below this temperature.

Casting and Heat Treatment. Casting and Heat Treatment of Some Aluminum-copper-magnesium Alloys, S. Daniels, A. J. Lyon and J. B. Johnson. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, p. 593. Treatment of duralumin; cast and heat-treated alloy. (Abstract.)

Casting-Temperature Effects. The Influence of Casting Temperature of Aluminum Alloys, F. H. Hurren. Foundry Trade Jl., vol. 29, no. 388, Jan. 24, 1924, pp. 75-79. Results of experiments.

Castings. Aluminum Alloy Castings from Sheet Scrap, H. C. Kneer. Am. Foundrymen's Assn.—Preprint of paper no. 417, for meeting Oct. 11-16, 1924, 12 pp., 7 figs. See also (abstracts) Metal Industry (N. Y.), vol. 22, no. 12, Dec. 1924, pp. 481-482, 2 figs., and Metal Industry (Lond.), vol. 25, no. 20, Nov. 14, 1924, pp. 470-472, 2 figs. Outlines methods by which a very small foundry, started on an experimental basis, succeeded in meeting requirements for sound and dependable aluminum alloy sand castings, only scrap aluminum sheet and copper available at factory being used. Castings made were required to meet government specifications corresponding approximately to S.A.E. specifications No. 30.

Castings, Hard Spots in. Study Aluminum Hard Spots, A. J. Lyon. Foundry, vol. 52, no. 10, May 15, 1924, pp. 396-397. Methods employed to identify inclusions, and determine effect on mechanical properties, and metallographic structure of oxidizing aluminum cast alloys during melting.

Castings, Salvage of. The Salvage of Aluminium-Alloy Castings by Soldering and Welding, R. J. Anderson and M. E. Boyd. Metal Industry (Lond.), vol. 25, no. 24, Dec. 12, 1924, pp. 571-574, 12 figs. Salvage specifications; metallurgical aspects of salvage problem. (Abstract.) Paper presented to Am. Foundrymen's Assn.

Copper-Aluminum. See COPPER ALLOYS, Copper-Aluminum.

Corrosion. See ALUMINUM, Corrosion.

Corrosion Prevention, Treatment for. Investigation of the Z-D Process for Treatment of Light Alloys to Inhibit Corrosion, to Minimize Porosity and to Effect Desired Physical Properties, A. C. Zimmerman and S. Daniels. U. S. Air Service Information Circular, vol. 5, no. 448, Mar. 1, 1924, 22 pp., 15 figs. Results of investigations show that process prevents corrosion of aluminum and its alloys more effectively and efficiently than any other inorganic coating process, but is not so effective in minimizing porosity as Norton process.

Die Casting. Aluminum Die Casting (Aluminium-Spritzguss), Frommer. Praktische Maschinen-Konstrukteur, vol. 57, nos. 45 and 49, Nov. 25 and Dec. 23, 1924, pp. 613-615 and 671-672, 1 fig. Discusses die casting of alloys of more than 75 per cent aluminum; properties and uses of die-cast parts; defects of castings; tensile-strength tests.

Duralumin. See DURALUMIN.

Foundry Practice. See ALUMINUM, Foundry Practice.

Lautal. Lautal (Lautal), V. Fuss. Zeit. für Metallkunde, vol. 16, no. 9, Sept. 1924, p. 343. Data on strength and properties of new aluminum alloy.

Light. See Microstructure and Properties; Production.

Magnesium-Free. New Light Alloys of High Resistance (Un nouveau type d'alliages légers à haute résistance), A. Portevin and F. Le Chatelier. Chimie & Industrie, special no., May 1924, pp. 337-340, 4 figs. Results of tests on light alloys with aluminum base without addition of magnesium; advantages of these alloys as compared with duralumin.

Magnesium in. Cast Alloys of Aluminium Containing Small Amounts of Magnesium, S. Daniels. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1243-1249, 19 figs. Small additions of magnesium progressively increase strength and hardness of aluminum, but more rapidly decrease its ductility; heat treatment is not economically justifiable; describes metallography of several alloys.

Metallography. Metallography of Sand Cast Aluminum Alloys, A. J. Lyon and S. Daniels. U. S. Air Service Information Circular, vol. 5, no. 449, Mar. 1, 1924, 19 pp., 54 figs. Defines technique employed in metallography of aluminum and its alloys by Material Section, Engr. Div., Air Service.; illustrates and describes common constituents and characteristic microstructure of cast-aluminum alloys used by Air Service.

Microstructure and Properties. Light Alloys of Aluminium, W. Rosenhain and S. L. Archbutt. Engineering, vol. 117, nos. 3049 and 3050, June 6 and 13, 1924, pp. 750-752 and 780-782, 14 figs. Also Metal Industry (Lond.), vol. 25, nos. 1 and 2, July 4 and 11, 1924, pp. 3-7, and 27-30 and 44, 14 figs. Specific tenacity; age hardening; casting alloys and wrought alloys in general use; microstructure and properties of chief alloys; heat treatment; application.

Production. History of Light Aluminum Alloys and Actual Status of Their Production (Historique des alliages légers d'aluminium et état actuel de leur fabrication), L. Guillet. Génie Civil, vol. 84, nos. 13, 14 and 15, Mar. 29, Apr. 5 and 12, 1924, pp. 298-303, 319-321, and 356-359, 9 figs. Traces history of development and describes latest improvements.

Properties. Aluminum and Some of Its Physical Characteristics. Metal Industry (N. Y.), vol. 22, no. 9, Sept. 1924, pp. 349-351. Discusses properties of alloys made by Aluminum Co. of America; aluminum die castings, and wrought aluminum.

Comparative Tensile Properties of Copper-Silicon-Aluminium and Other Aluminium Alloys

as Obtained on Separately Cast Specimens and Specimens Cut From a Crank-Case Casting, E. H. Dix and A. J. Lyon. Inst. of Metals—Advance paper no. 4, for meeting Sept. 8-11, 1924, 14 pp., 21 figs. on supp. plates. Particulars of investigation undertaken by Metallurgical Sec., Eng. Division U. S. Air Service, to furnish information on comparative physical properties to be expected in large castings to aircraft designers.

Quaternary. The Aluminum-Rich Mixed-Crystal Range in Quaternary System Aluminum-Magnesium-Silicon-Zinc. (Das aluminiumreiche Mischkristallgebiet im Vierstoffsystem Aluminium-Magnesium-Silizium-Zink), W. Sander and K. L. Meissner. Zeit. für Metallkunde, vol. 16, no. 1, Jan. 1924, pp. 12-17, 9 figs. Based on investigations, authors present their views on process of refining in self-refining aluminum alloys and describe refining phenomena observed in certain aluminum alloys.

Salt-Water Corrosion, Resistance to. Resistance of Various Aluminum Alloys to Salt-Water Corrosion, D. Basch and M. F. Sayre. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 199-201 and (discussion) 201-205, 3 figs. Results of tests of 24 different compositions under conditions analogous to service on shipboard, showing that corrosion troubles hitherto experienced have been due to use of unsuitable alloys.

Sand-Cast. Notes on a Sand-Cast Aluminum-Copper-Nickel-Magnesium Alloy, A. J. Lyon and S. Daniels. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 173-181, 12 figs. Describes foundry practice and tabulates physical properties of sand-cast aluminum-base alloy containing 4 per cent of copper, 2 per cent of nickel, and 1.5 per cent of magnesium; outlines methods of heat-treating this alloy to obtain maximum hardness and tensile properties; physical testing results were obtained in connection with manufacture of pistons and air-cooled cylinder heads for aircraft engines.

Scleron. Scleron Alloys (Scleron-Legierungen), O. Reuleaux. Zeit. für Metallkunde, vol. 16, no. 11, Nov. 1924, pp. 436-437, 1 fig. Aluminum alloys placed on market by Metallbank and Metallurgischen Gesellschaft, Frankfurt a.M., Germany, have aluminum content of not less than 85 per cent; composition, heat treatment, and strength properties of new alloy.

Steel, vs. Steel and Light Alloys as Engineering Materials, L. Aitchison. West of Scotland Iron & Steel Inst.—Jl., vol. 32, part 1, Oct.-Nov. 1924, pp. 10-15 and (discussion) 15-21. Comparison of steel on one side and light alloys on other, in order to see to what extent replacement of steel by light alloys can be expected.

Ternary. The Constitution of Ternary Alloys of Aluminum (Ueber die Konstitution von Dreistoffiegierungen des Aluminiums), V. Fuss. Zeit. für Metallkunde, vol. 16, no. 1, Jan. 1924, pp. 24-25, 3 figs. Determination of structure of 15 alloys with respect to influence of additional metals on basic aluminum.

Thermal Expansion. On the Measurement of the Coefficients of Thermal Expansion for Aluminium Alloys and Alloys of Nickel-Iron and Cobalt-Iron, K. Honda and Y. Okubo. Tohoku Imperial University—Sci. Reports, vol. 13, no. 1, Oct. 1924, pp. 101-107, 5 figs. partly on supp. plate. Results of measurement of different aluminum alloys commonly used in aeronautics in Europe and America, and of nickel iron and cobalt iron prepared in research institute.

Use on Board Ship. Aluminum and Aluminum Alloys for Use on Board Ship, E. M. Hewlett and D. Basch. Am. Soc. Nav. Engrs.—Jl., vol. 36, nos. 1 and 2, Feb. and May 1924, pp. 1-17 and 288-301. Feb.: Fabricated alloys; rolling; forging. May: Soldering of aluminum; welding; aluminum in contact with other metals; use for electrical purposes.

ALUMINUM BRONZE

Heat-Treated, Hardness of. Notes on the Hardness of Heat-treated Aluminum Bronze, G. F. Comstock. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1357-N, July 1924, 9 pp., 4 figs. and (abstract) Minn. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 596-597. Results of scleroscope and Brinell tests on specimens of cast 10 per cent aluminum bronze, quenched and reheated at various low temperatures.

ALUMINUM CHLORIDE

Clay, Preparation from. See CLAY, Aluminum Chloride from.

ALUMINUM OXIDE

Production from Clay. Production of Aluminum Oxide from Clay (Fremstilling av aluminiumoksyd av lere), Teknisk Ukeblad, vol. 71, nos. 8 and 9, Feb. 22 and 29, 1924, pp. 75-77 and 83-86. Enumerates available raw materials; describes Bayer and Morin methods: comparison of Bayer bauxite process and clay process; stages in production of aluminum oxide.

ALUMINUM WARE

Manufacture. Aluminum Tea Kettles. Metal Industry (N. Y.), vol. 22, no. 5, May 1924, pp. 187-188, 15 figs. Short summary of stages in manufacture of an aluminum tea kettle from ground to kitchen.

Stamping and Spinning Modern Aluminum Ware, H. P. Armson. Can. Machy., vol. 31, no. 11, Mar. 13, 1924, pp. 19-21, 3 figs. Brief description of methods employed at plant of Metal Stampings, Ltd., Toronto, Can., in manufacture of household utensils.

ALUNITE

Uses. Alunite, C. H. MacDowell. Armour Engr., vol. 15, no. 4, May 1924, pp. 134 and 153-154. A double salt of potassium sulphate and aluminum sulphate. A promising source of potash, refractories, and other important heavy chemicals.

AMALGAMS

Liquid, Use in Volumetric Analysis. Use of Liquid Amalgams in Volumetric Analysis (Die Anwendung von flüssigem Amalgam in der volumetrischen Analyse), K. Someya. Zeit. für anorganische u. allgemeine Chemie, vol. 138, no. 3, Sept. 1, 1924, pp. 291-303, 1 fig. Use of zinc and bismuth amalgams; reduction of ferric salts to ferrous state with bismuth amalgam.

X-Ray Examination. X-Ray Examination of Amalgams (Röntgenuntersuchungen an Amalgamen), C. v. Simson. Zeit. für Physikalische Chemie, vol. 109, no. 3-4, May 5, 1924, pp. 183-198, 8 figs. Results of examination of structure of amalgams of tin, zinc, cadmium, and lead by means of X-rays.

AMBULANCES

Airplane. See AIRPLANES; Ambulance.

AMERICAN ENGINEERING COUNCIL

Work of. See ENGINEERING SOCIETIES, American Engineering Council.

AMMETERS

High-Frequency. New High-Frequency Ammeter with Thermocouple (Nouvel ampèremètre H.F. à thermo élément), M. Pillier. Onde Electrique, vol. 3, no. 25, Jan. 1924, pp. 5-11, 5 figs. Describes new apparatus constructed by Chauvin & Arnoux which has advantage of making measurements with a single galvanometer of as small dimensions as desired, due to interchangeable shunts which permit measurement with same apparatus of from 5 to 500 amperes.

Milliampere. Milliampere Meter in the Anode Circuit of the Audion with Blocked Grid (Das Milliamperemeter im Anodenkreise des Audions mit blockiertem Gitter), H. G. Möller. Zeit. für Fernmeldetechnik, vol. 5, no. 10, Oct. 16, 1924, pp. 96-100, 12 figs. Measuring of waves and amplitudes. Theory of audion rectifier curves and of oscillation curves, and application to examples.

AMMONIA

Absorption. See CARBON DIOXIDE, Absorption from Gas Bubbles.

Anhydrous. Is Anhydrous Ammonia Combustible? W. F. Schaphorst. Nat. Engr., vol. 28, no. 5, May 1924, pp. 220-221. Opinions of authorities and experts, from which it appears that it is feebly combustible under certain conditions but normally incombustible and actually a retardent of combustion in many cases.

By-Product. By-Product and Synthetic Ammonia. Gas Engr., vol. 40, nos. 574 and 575, Feb. and Mar. 1924, pp. 24-25 and 48-49. Account and criticism of modern methods of by-product ammonia production. Discusses potential ammonia in coal, ammonia per ton carbonized, excessive addition of lime, heat interchange devices, and ammonium bicarbonate and chloride and their possibilities as commercial fertilizers.

Catalyst for Forming. See CATALYSTS, Ammonia-Forming.

Decomposition by Ultra-Violet Light. Influence of Temperature on the Decomposition of Ammonia by Ultra-Violet Light (Influence de la temperature de l'ammoniaque par les rayons ultra-violets), W. Kuhn. Academie des Sciences—Comptes Rendus, vol. 178, no. 8, Feb. 18, 1924, pp. 708-709. Rate of photochemical decomposition is independent of pressure (30 mm.-300 mm.) and rises with temperature (20-500 deg.), though more slowly than in most chemical reactions; rate falls off as decomposition proceeds; nitrogen does not affect rate, which is lessened by hydrogen.

Fixation in Coke-Oven Gas. Fixing of Ammonia in Coke-Oven Gas by Means of Calcium Sulphate (Ueber die Bindung des Kokerei-Ammoniaks durch Gips), G. E. Tunius. Gas- u. Wasserfach, vol. 67, no. 8, Feb. 23, 1924, pp. 91-92, 1 fig. Experiments on washing of gas, from which all tar had been removed, with suspension of calcium sulphate on counter-current principle in revolving column, showed that 98 per cent of ammonia present in gas could be recovered in this way; rest was washed out by treatment with water; process, however, requires careful chemical control, is costly, and in normal times cannot compete with usual sulphuric-acid process.

Formation from Nitrogen. Formation of Ammonia from Nitrogen in the Oxyhydrogen Flame (Ueber Ammoniakbildung in der stickstoffhaltigen Knallgasflamme), H. Tominaga. Zeit. für Elektrochemie, vol. 30, no. 21-22, Nov. 1924, pp. 528-534, 3 figs. Account and results of experiments; yield was greater, the smaller and cooler the oxyhydrogen flame was kept.

Oxidation to Nitric Acid. Catalytic Oxidation of Ammonia to Nitrous Gases and Nitric Acid (Ueber die katalytische Oxydation des Ammoniaks zu nitrosen Gasen und zu Salpetersäure), Geo. Kassner. Zeit. für angewandte Chemie, vol. 37, no. 25, June 19, 1924, pp. 373-382, 1 fig. Direct oxidation of ammonia to nitric acid by air is brought about by new catalyst, "nitroxan," composition of which is given; theory of reaction is considered in detail.

Specific Gravities of Solutions. A New Determination of the Specific Gravities of Solutions of Ammonia, N. J. Price and C. S. L. Hawkins. Chem. & Industry, vol. 43, no. 17, Apr. 25, 1924, pp. 113T-117T, 1 fig. Method developed by authors was to weigh ammonia solutions in sealed vessel and then to determine whole of ammonia contained in that vessel; comparison of table obtained by this method with Lunge table.

Synthetic. Catalyst Bombs for Synthetic Ammonia Production, E. K. Scott. Chem. Age. (Lond.), vol. 10, no. 256, May 10, 1924, pp. 482-483, 3 figs. Describes Haber-Bosch, Claude, and Casale catalyst bombs; catalyst material.

How I Effected the Synthesis of Ammonia by Means of Super-Pressures (Comment j'ai réalisé la synthèse de l'ammoniaque par les hyperpressions), G. Claude. Chimie & Industrie, vol. 11, no. 6, June 1924, pp. 1055-1066, 13 figs. Discusses development, including work of Haber, Nernst, etc.; describes his own work to overcome danger from bursting by removing heat of reaction by cold gases; liquefaction of nitrogen, etc.; application of Claude processes.

Increasing Ammonia Production with Improved Catalysts, A. T. Larson. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1002-1004. Review of important practical developments.

Industrial Processes of Direct Synthesis of Ammonia (Les procédés industriels de synthèse directe de l'ammoniac), L. Maugé. Revue Industrielle, vol. 54, no. 2182, Sept. 1924, pp. 261-266 and 311-317, 9 figs. Reviews developments, including work of Claude, Haber and Rossignol; particulars of Haber-Bosch, Claude, Casale, and Fauser processes.

Manufacture of Synthetic Ammonia at Coke Ovens, E. K. Scott. Gas World (Coking Section), vol. 80, no. 2067, Mar. 1, 1924, pp. 12-16 and (discussion) 16-17, 6 figs. Methods of fixing atmospheric nitrogen; Haber bomb for 200 atmos.; layout and cost figures of Claude plant; Claude catalyst bomb; Claude plant at coke ovens; uses of ammonia.

Synthesis of Ammonia at High Pressures (Ueber die Ammoniaksynthese bei hohen Drucken), W. Moldenhauer. Chemiker-Zeitung, vol. 48, no. 46, Apr. 15, 1924, pp. 233-234, 1 fig. Compares yield of synthetic ammonia obtained by Claude at very high pressures with theoretical yields deduced from Haber's ammonia equilibrium formula; discrepancies between actual and theoretical yields increase as temperature falls and as pressure rises; they are probably due to differences in compressibilities of ammonia and of more permanent gases, nitrogen and hydrogen.

Synthetic Ammonia Manufacture at Coke Ovens, E. K. Scott. Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1920, Mar. 7, 1924, pp. 283-284. Commercial development of Claude process; description of French plants designed by G. Claude.

Synthetic Ammonia Production in Coke Oven and Gas Works. Gas Engr., vol. 40, nos. 578 and 581, June and Sept. 1924, pp. 120-121 and 190-191. Discusses increased demand for fertilizers, Claude and Haber-Bosch processes, consumption of current, large power requirements, carbon monoxide and steam, and use of spathic iron ore.

The Nera Montoro Plant for the Production of Synthetic Ammonia and Its Derivatives (Lo stabilimento di Nera Montoro per la produzione dell'ammoniaca sintetica e suoi derivati). Industria, vol. 38, no. 18, Sept. 30, 1924, pp. 504-508, 18 figs. Describes equipment and operation of plant of Societa Italiana Ammoniaca Sintetica, using Casale process.

See also NITROGEN, Fixation and Fixation Proceses.

Tables, Use of. See REFRIGERATION, Ammonia Tables, Use of.

Temperature Entropy Chart. Temperature-entropy Chart for Ammonia, W. M. Griffith. Ice & Refrig., vol. 66, no. 5, May 1924, pp. 462-465, 3 figs. Describes new temperature-entropy chart based on U. S. Bur. of Standards ammonia tables.

Construction of chart; diagram to illustrate its use; solution of practical problems by means of data from new diagram.

AMMONIA COMPRESSORS

Bernat System. A New French Ammonia Compressor. Refrig. Eng., vol. 11, no. 3, Sept. 1924, pp. 117-118, 1 fig. See also Cold Storage, vol. 27, no. 319, Oct. 16, 1924, pp. 423-424, 1 fig. Description, characteristics, and operation of Bernat system of compressor. Translated from Revue Générale du Froid.

Compound Compression. Effect of Compound Compression of Ammonia, J. E. Starr. Power Plant Eng., vol. 28, no. 8, Apr. 15, 1924, pp. 445-446, 1 fig. Cost of extra equipment, it is claimed, will in most cases offset thermodynamic gains which would result from compound compression.

Efficiency. Compressor Efficiency in Relation to Discharge-Pipe Temperature, E. Prestage. Ice & Cold Storage, vol. 27, no. 320, Nov. 1924, pp. 285-287, 3 figs. Reproduces and discusses indicator diagrams taken from a 15½-in. diameter by 30-in. stroke horizontal compressor working at Union Cold Storage Co.'s St. Petersburg store in 1911, with object of arriving at relative efficiency of compressor when working "wet" or "dry."

Flywheels. The Flywheel Problem in Compressors Direct Connected to Synchronous Motors, A. R. Stevenson, Jr. Refrig. Eng., vol. 11, no. 4, Oct. 1924, pp. 123-140 and (discussion) 140-142, 23 figs. Reasons for limiting current pulsation of synchronous motors driving ammonia compressors; outline of history of various methods of calculating flywheels; discusses set of curves used since November, 1921, for rapid and accurate calculation of flywheels. Am. Soc. Refrig. Engrs. specifications covering design of synchronous motors for direct connection to ammonia compressors.

High-Speed. See REFRIGERATING PLANTS, High-Speed Compressor Installation.

Multi-Effect Compression. A Gift of Extra Compressor Capacity, G. Grow. Power, vol. 59, no. 19, May 6, 1924, pp. 723-724, 4 figs. Ways of handling ammonia at two suction pressures; advantages of multi-effect compression; net saving of process.

AMMONIA CONDENSERS

Atmospheric and Vertical Tubular Types. Ammonia Condensers, N. H. Hiller. Ice & Refrigeration, vol. 67, no. 6, Dec. 1924, pp. 386-388, 8 figs. Paper presented before Nat. Assn. Practical Refrig. Engrs., in which author confines his remarks to handling of two types of condensers, viz., atmospheric and vertical tubular types; diagrams and illustrations of apparatus.

Brine Coolers and. Condensers and Brine Coolers, J. C. Goosman. Ice & Refrigeration, vol. 66, nos. 1, 2, 3, 4, 6 and vol. 67, no. 2, Jan., Feb., Mar., Apr., June and Aug. 1924, pp. 84-86, 183-184, 247-248, 350-351, 545-547, and 113-115, 20 figs. Standard heat conditions; conditions existing below and above critical temperatures; pressure-temperature curve for CO_2; selection of condenser type; development of CO_2 condensers; stages of condensation; increasing of efficiencies; effect of surface and water requirements upon condenser and horsepower; pressure heat content diagram for ammonia; temperature surface diagram; diseases of condensers; etc.

Investigation of. Investigations of Ammonia Condensers, T. Shipley. Ice & Refrigeration, vol. 66, no. 1, Jan. 1924, pp. 17-22, 2 figs. See also (abstract) Power, vol. 59, no. 10, Mar. 4, 1924, pp. 364-367, 4 figs. Discusses condensers used on ammonia compression plants. Results of earlier investigations; advantages of low condenser pressures; development of design of Hestonville condenser and author's reasons for assuming such a design would give better results than other types; results of tests.

Superheat at. Superheat at the Condenser, J. E. Starr. Ice & Refrig., vol. 66, no. 5, May 1924, pp. 461-462. Discussion of determination of amount of superheat in ammonia at condenser; effect of power requirements; a possible way of utilizing superheat by absorption system; means of reducing superheat.

AMMONIUM NITRATE

[See also EXPLOSIVES, Ammonium Nitrate; Mine.]

Explosion Hazard. Is Ammonium Nitrate an Explosive? R. Aufschläger. Chem. & Met. Eng., vol. 30, no. 16, Apr. 21, 1924, pp. 619-621. Points out that ammonium nitrate and its mixtures, although extremely insensitive, can be detonated with certainty under some conditions. Translated from Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 18, Nov.-Dec. 1923, p. 117. See also reviews by leading authorities, pp. 621-623, which may be regarded as survey of expert opinion, reflecting briefly present status of knowledge of properties and behavior of ammonium nitrate.

Use as Explosive. Ammonium Nitrate as an Explosive, R. M. Cook. Chem. & Met. Eng., vol. 31, no. 6, Aug. 11, 1924, pp. 231-233, 1 fig. Ammonium nitrate, NH_4NO_3, in its pure state, contains 20 per cent more oxygen than is required for its complete combustion—that is, to oxidize hydrogen to water, evolving nitrogen as gaseous element.

AMMONIUM SALTS

Volumetric Determination. Volumetric Determination of Ammonium Salts (Nouveau procédé de dosage titrimétrique des sels ammoniacaux), V. Auger. Académie des Sciences—Comptes Rendus, vol. 178, no. 13, Mar. 24, 1924, pp. 1081-1082. Method is based on fact that if caustic soda is added to solution of ammonium salt to which Nessler's reagent has been added, no brown coloration is produced until sufficient alkali has been added to decompose ammonium salt; slight excess of alkali then gives permanent brown coloration; method gives excellent results within usual limits of dilution.

AMMONIUM SULPHATE

Centrifuging. Centrifuging, Neutralizing and Drying Sulphate of Ammonia, G. Weyman. Gas Engr., vol. 40, no. 583, Nov. 1924, pp. 247-248. Filling centrifuge; presence of pyridine and iron. (Abstract.) Paper read before North of England Gas Mgrs.' Assn.

Effluent Liquor, Treatment of. Sulphate of Ammonia Works: Treatment of Effluent Liquors. Gas Wld., vol. 81, no. 2085, July 5, 1924, pp. 8-12, 4 figs. Gives results of analyses made of various samples of liquor; discusses research at London gas works, horizontal retort system, vertical retort systems, effect of contact with tar in storage well, and alterations in condensing system.

Manufacture and Neutralization. By-Product Sulphate of Ammonia Manufacture, P. Heigham. Chem. Age. (Lond.), vol. 10, no. 263, June 28, 1924, pp. 669-670. Reviews succinctly progress made in manufacture of by-product sulphate of ammonia in last ten years, particularly in production of neutral quality, and deals with methods of neutraliaztion, drying, and crushing.

Manufacture of Neutral Sulphate of Ammonia, G. Stephenson. Gas World (Coking Section), vol. 80, no. 2067, Mar. 1, 1924, pp. 18-22, 7 figs. Also Colliery Guardian, vol. 127, no. 3297, Mar. 7, 1924, p. 607. Deals with sulphate of ammonia produced by direct process; Saville neutralizer; effect of neutralizing on crystals.

Observations on the Manufacture of Neutral Dry Sulphate of Ammonia, H. J. Hailstone. Gas Jl., vol. 166, no. 3178, Apr. 9, 1924, pp. 102-104, 1 fig. Principles involved in manufacture of improved product; describes drying operation.

Plant Used in Sulphate of Ammonia Manufacture, S. Stonier. Gas World, vol. 80, no. 2063, Feb. 2, 1924, pp. 13-27, 6 figs. Manufacture and neutralization of sulphate of ammonia.

The Manufacture and Neutralization of Sulphate of Ammonia, C. Bateman. Gas Jl., vol. 166, no. 3187, June 11, 1924, pp. 750-752 and (discussion) 752-753, 5 figs. Describes methods of neutralization by means of caustic soda solution, solution of soda ash, and solution of ammonia.

The Production of Sulphate of Ammonia, G. Weyman. Gas Wld., vol. 81, no. 2101, Oct. 25, 1924, pp. 417-420 (includes discussion). See also Gas Jl., vol. 168, no. 3205, Oct. 15, 1924, pp. 166-168. Nitrogen in coal and its distribution, how nitrogen occurs, design and arrangement of scrubbing plants, design and working of saturators, centrifuging, neutralizing and drying, etc.

AMMUNITION

Patent Specifications. Ammunition and Ammunition Receptacles. Abridgments of Specifications (Lond.), Class 9(i), 1923, Period 1916-20, 202 pp. Patents for inventions.

ANEMOMETERS

Hot-Wire. The Measurement of Air Flow, R. O. King. Engineering, vol. 117, nos. 3031 and 3034, Feb. 1 and 22, 1924, pp. 136-137 and 249-251, 9 figs. The Callendar hot-wire anemometer, its arrangement for practical use in air measurement, calibration, and comparison with other methods from experimental results.

Maximum-Wind-Intensity. A Simple Anemometer for Determining Maximum Intensity of Wind (Un anémometre à maximum simple), P. L. Mercanton. Nature (Paris), no. 2601, Feb. 23, 1924, pp. 124-126, 2 figs. Describes instrument developed by author.

ANNEALING

Furnaces. See FURNACES, ANNEALING.

Steel. See STEEL, HEAT TREATMENT of, Annealing.

ANTIMONY

Early History. The Early History of Antimony, H. Hyman. Chem. & Industry, vol. 43, no. 41, Oct. 10, 1924, pp. 1006-1007, 1 fig. Part played by antimony in early history of chemistry.

Electrodeposition of. See ELECTRODEPOSITION, Antimony.

Estimation in Ores and Alloys. Applied Methods of Estimating Antimony in Ores, Slags, Alloys, etc. Metal Industry (Lond.), vol. 25, no. 22, Nov. 28, 1924, pp. 515-516. Estimation of antimony in rich ores by bigallate (Guyard) method; methods for impure ores, slags, mattes, etc.; estimating constituent metals in alloys by potassium-permanganate titration; potassium-bromate and iodine-monochloride methods for alloys.

Determination of Antimony (Antimonbestimmungen), A. Ecke. Chemiker-Zeitung, vol. 48, no. 92-93, Aug. 1, 1924, p. 537. In absence of lead antimony may be determined by dissolving portion of metal in warm hydrochloric acid containing a cupric salt, operation being carried out in atmosphere of CO_2; describes how to determine antimony in alloy also containing tin, lead, and copper.

Ore Concentration. The Lake George Antimony Ores and their Concentration, C. S. Parsons. Can. Min. Jl., vol. 5, no. 40, Oct. 3, 1924, pp. 984-985. History, geology, concentration, and flotation; tests.

APPRENTICES, TRAINING OF

Aircraft. Training of Aircraft Apprentices at Halton Camp. Engineer, vo . 137, nos. 3553 and 3554, Feb. 1 and 8, 1924, pp. 119-120 and 138-141, 7 figs. partly on p. 148. Describes barracks and camp in general, and refers to special training which is given youths while in residence. Choice of apprentices; method of training; heating arrangements; water supply; sanitary and mess arrangements.

Automobile Repair-Shop Mechanics. Training Men for Automobile Repair Work, J. Younger. Am. Mach., vol. 61, no. 11, Sept. 11, 1924, pp. 423-425, 3 figs. Outline of plan used for training men for Buick service stations and showing how flat rates are set for automobile repairs.

Coöperative Plan. Making the Skilled Mechanic of Tomorrow, F. A. Pope. Indus. Mgmt. (N. Y.), vol. 67, no. 6, June, 1924, pp. 363-367, 5 figs. Coöperative plan for apprentice training in metal trades, developed by Natl. Metal Trades Assn.

Draftsmen and Patternmakers. Training Draftsmen and Patternmakers. Machy. (N. Y.), vol. 30, no. 10, June 1924, pp. 787-789, 4 figs. Outline of courses given at Worcester Boys' Trade School.

Foundry. An Apprentice Tells His Thoughts. Iron Trade Rev., vol. 75, no. 25, Dec. 18, 1924, pp. 1641-1643. See also Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 917-919 and 928. Author gives pointers from his experience and portrays life on receiving end of foundry training course.

How Mesta Makes Molders, R. A. Peebles. Foundry, vol. 52, no. 21, Nov. 15, 1924, pp. 881-884, 3 figs. Plan adopted by Pittsburgh shop in training young men to supply deficiency; describes regular and special courses.

Recent Developments in Foundry Education and Training in France, J. G. Pearce. Foundry Trade Jl., vol. 30, no. 422, Sept. 18, 1924, pp. 248-249. Particulars regarding scheme recently put into operation by French Foundry Employers' Assn. to encourage entry of suitable youths to foundries by providing systematic apprenticeship and training courses for all, and means whereby any young man of capacity and intelligence may obtain knowledge and experience necessary to fit him for any position in the industry to which he may be promoted. Extracted from Bul. of Brit. Cast Iron Research Assn.

Solves Training of Apprentices. Iron Trade Rev., vol. 75, no. 16, Oct. 16, 1924, pp. 1018-1022, 6 figs. Wisconsin law requiring employed persons under 18 to spend one-half day each week in some school has enabled many workers to obtain trade training; foundry practice popular.

Training the Foundry Apprentices, R. A. Peebles. Iron Trade Rev., vol. 75, no. 24, Dec. 11, 1924, pp. 1570-1572 and 1578, 3 figs. Outline of course given at Pittsburgh shop.

Wisconsin Solves Apprentice Puzzle. Foundry, vol. 52, no. 19, Oct. 1, 1924, pp. 752-757, 5 figs. Describes plan, successful over a number of years' trial, evolved by state of Wisconsin, its industrial leaders, its educators, and its great army of workmen. Outline of how plan works at plant of Falk Corpn.

France. The Training of Apprentices (L'Apprentissage), Société des Ingenieurs Civils—Mémoires et Compte Rendu des Travaux, vol. 76, no. 10-12, Oct.-Dec. 1923, pp. 1172-1281. Account of what has been accomplished in 13th ward of Paris, by Ch. Quillard; laws and organization of Syndicate of Mechanics, Boiler Makers and Foundrymen with regard to training of apprentices and vocational instruction, J.

Quantin; training of apprentices from pedagogical viewpoint, M. Loffet; training of shop apprentices in its relation to rational organization of work, J. Androuin; rapid development of apprenticeship, M. Lacoin; the crisis in apprenticeship and its remedy, and technical instruction, J. Hiernaux; training of apprentices at steel works of Schneider, Jaquet & Cie, Strasbourg, and Cockerill Works, Belgium, E. Kern; theoretical vocational training and education during period of apprenticeship, M. Bostsarron; apprenticeship in the electrotechnical industry, Geo. Westercamp; school for training of apprentices at works of Dion-Bouton, M. Winder.

Germany. New Methods in the Education of Apprentices and Mechanics in Germany, Wm. F. Turnbull. Jl. Eng. Education, vol. 15, no. 3, Nov. 1924, pp. 195-196. Under auspices of Verein Deutscher Ingenieure (Assn. German Engrs.), joint committee of delegates from engineering society and shops and drafting rooms of principal industrial plants of Germany devised comprehensive system of instruction for apprentices and also for skilled workmen.

Workers' Education and Training. Monthly Labor Rev., vol. 18, no. 5, May 1924, pp. 178-181. Apprenticeship on German State railroads and in Berlin metal industry.

Graduate Engineers. Duquesne Light Company Trains Engineers, R. L. Kirk. Elec. World, vol. 84, no. 26, Dec. 27, 1924, pp. 1354-1356. College graduates spend year in company departments; outline of course and results accomplished; a typical class.

Patternmakers and Molders. Apprentice Course Is Established, E. C. Kreutzberg. Iron Trade Rev., vol. 75, no. 7, Aug. 14, 1924, pp. 413-414, 2 figs. Foundrymen's Assn. of New Jersey inaugurates plan of instruction in practical foundry work to recruit ranks of iron molders in that district. Outline of course.

Modern Apprenticeship Training of Patternmakers and Molders (Neuzeitliche Ausbildung der Modelltischler- und Formerlehrlinge), R. Harm. Giesserei-Zeitung. vol. 21, no. 7, April 1, 1924, pp. 135-140, 6 figs. Development of industrial training of apprentices, and of so-called DATSCH charts worked out by German Committee for Technical Education; DATSCH instruction courses and their practical application.

Problem of. See MACHINE SHOPS, Apprenticeship Problem.

Railways. Apprenticeship Methods on the Santa Fe. Ry. Mech. Engr., vol. 98, nos. 6, 7, 8, and 9, June, July, Aug., and Sept. 1924, pp. 355-359, 415-418, 467-472, and 527-531, 28 figs. Description of apprenticeship methods followed on Atchison, Topeka & Santa Fe. How and why work was started; selection of apprentices; equipment; instructions given in shop schools, methods and schedule of shop work followed in the various departments of shops, tools furnished, qualifications of instructors and source of their supply, records maintained regarding work and qualifications of each apprentice, apprentice boards, instructors' conventions, moral training and discipline of apprentices, apprentice clubs, special apprentices, apprentice graduates, etc. Direct and indirect results derived from this apprentice training system.

Training Apprentices, H. L. Shipman. Car Foremen's Assn.—Proc., vol. 18, no. 7, Apr. 1924, 15 pp. between pp. 12 and 52 (including discussion). Basic elements that must be given consideration before an apprenticeship system is undertaken by a railroad. Suggestions regarding establishment of system and training of apprentices.

System. A Modernized Apprentice System. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 415-418, 6 figs. How apprentices are trained by Warner & Swasey Co. in shop and classroom work.

AQUEDUCTS

Tulsa, Okla. Building the 54-Mile Aqueduct for the City of Tulsa, Oklahoma. Contractors' & Engrs.' Monthly, vol. 8, no. 1, Jan. 1924, pp. 53-55, 3 figs. Water from Spavinaw Creek in the Ozarks to be brought through 54 mi. of concrete pipe; four 25-ton locomotive cranes on flanged-track wheels and one 10-ton locomotive crane on continuous chain treads are used to place pipe sections in trench.

ARCHES

Calculation. Calculation of Two-Hinged Arches Balanced by a Polygonal Anchorage (Calcul de l'arc à deux rotu es équilibrés par un chainage polygonal), C. Molitor. Génie Civil, vol. 84, no. 5, Feb. 2, 1924, pp. 105-109, 17 figs. Describes method of calculation for particular case; determination of fundamental lines of influence according to two methods.

Method of Finding Arch Outline of Equal Stresses (Verfahren zum Aufsuchen der Bogenlinie gleicher Anstrengungen), E. Proksch. Beton u. Eisen, vol. 23, no. 3, Feb. 5, 1924, pp. 33-36, 1 fig. Suggestions for solution of problem.

Concrete. An Economical Design for Arch Centres, A. E. Wynn. Engineering, vol. 118, no. 3060, Aug. 22, 1924, pp. 257-259, 4 figs. partly on supp. plate. Also in Eng. & Contracting (Buildings), vol. 62, no. 5, Nov. 26, 1924, pp. 1161-1166, 3 figs. Describes centering built in fall of 1922 for bridge over Salmon River at Pulaski in New York State. Design, being so successful in its first use, has been adopted practically as a standard by contractors, and this design, and same lumber is being used for third time. Pulaski Bridge is a two-rib open spandrel arch of 200 ft. clear span and rise of 26 ft. 6 in., distance from crown to river bed being about 40 ft.

Design of Symmetrical Concrete Arches, Chas. S. Whitney. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 9, Nov. 1924, pp. 1327-1425, 56 figs. Gives method of analysis believed to be considerably simpler than any accurate method of applying elastic theory to symmetrical arches heretofore published; results given by tables and diagrams may be used for final design since tney are as accurate as can be obtained by any other method of applying elastic theory.

The Design of Reinforced Concrete Arch Ribs, A. P. Mason. Concrete & Constructional Eng., vol. 19, no. 3, Mar. 1924, pp. 143-150, 5 figs. Describes accurate short-cut method of obtaining a preliminary design.

See also Skew.

Conical. Calculation of Conical Arches (Zur Berechnung konischer Gewölbe), F. Schleicher. Bauingenieur, vol. 5, no. 21, Nov. 10, 1924, pp. 681-686, 3 figs. Develops formulas and makes calculations. Shows that effect of conicity is increased movement at fixed end.

Design. The Design of Masonry and Concrete Arches, A. C. Hughes. Surveyor & Mun. & County Engr., vol. 66, no. 1709, Oct. 17, 1924, pp. 315-316, 1 fig. Reviews present position and, by a liberal reference to literature dealing with arches, presents a bibliography of information.

Elliptical. Formulas for Elliptical Arches, F. A. Smith. Eng. & Contracting (Water Works), vol. 61, no. 4, Apr. 9, 1924, pp. 769-770, 4 figs. How to change circular channel to elliptical shape.

Fixed-Ended. Statics of Fixed Arches (Zur Statik eingespannter Gewölbe), S. Kasarnowsky. Bauingenieur, vol. 5, no. 12, June 30, 1924, pp.

366-367, 4 figs. General method for simple calculation of tension due to own weight of arches, whose center line deviates from pressure ine of own weight.

Hinged. On the Calculation of Hinge Blocks (Ueber die Berechnung der Gelenkquader), E. Mörsch. Beton u. Eisen, vol. 23, no. 12, June 20, 1924, pp. 156-161, 16 figs. Discusses hinges of bridge arches, rolling contact joints, and calculation of stresses.

Multiple. The Design of a Multiple-Arch System and Permissible Simplifications, A. C. Janni. Am. Soc. Civil Engrs.—Proc., vol. 50, no. 6, Aug. 1924, pp. 755-794, 21 figs. Discusses permissible simplification or shortening of strictly theoretical method of designing multiple-arch system, arches of which cannot be considered as having fixed ends. See (discussion) in nos. 8, 9, and 10, Oct., Nov., and Dec. 1924, pp. 1315-1318, 1516-1526, and 1582-1595, and vol. 51, no. 1, Jan. 1925, pp. 93-129, 43 figs.

Skew. Analysis of the Stresses in the Ring of a Concrete Skew Arch, J. Chas. Rathbun. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 2, Feb. 1924, pp. 133-174, 10 figs. Mathematical analysis of stresses in arch with fixed ends, with examples of application of formulas derived. See also (discussion) in nos. 4 and 5, Apr. and May 1924, pp. 559-560 and 679-705, 11 figs.

Orthogonal Bonds of Skew Arches (Sur l'appareil orthogonal des voûtes biaises), A. Claeys. Assn. des Ingénieurs sortis des Écoles Spéciales de Gand—Annales, vol. 14, series 5, 1924, pp. 161-171, 3 figs. Details of methods of calculation.

Thrust, Calculation of. Calculation of Thrust of Arch on its Movable Bearings with or without Tie Rod (Calcul de la poussée d'un arc sur ses appuis mobiles avec ou sans tirant), G. Prudon. Génie Civil, vol. 84, no. 9, Mar. 1, 1924, pp. 203-205, 3 figs. Study of influence of instability of bearings on thrust of arch or beam resting upon these bearings, and rôle of a supplementary stiffening tie rod of bearings.

Two-Hinged. Axial Bending Moments of Parabolic Double-Hinged Arches (Die achsialen Biegungsmoments parabolisch gekrümmter Zweigelenkbogen). A. Troche. Beton u. Eisen, vol. 23, nos. 11 and 13, June 5 and July 5, 1924, pp. 138-142 and 170-173, 8 figs. Gives two tables for influence lines of moments and explains their use.

ARMATURES

Banding of. Modern Repair Shop Practice in Banding Armatures, E. C. Parham. Nat. Engr., vol. 28, nos. 1, 2, 3, and 4, Jan., Feb., Mar., and Apr. 1924, pp. 11-13, 60-61, 110-112, and 157-159, 8 figs. Practical discussion of factors to be considered in banding armatures of different types; tools and devices used in applying bands; detailed instructions for doing work.

Coils, Types of. Reconnecting Direct-Current Armatures, A. C. Roe. Power, vol. 59, no. 22, May 27, 1924, pp. 866-867, 8 figs. Types of armature coils.

Eddy-Current Losses. Calorimetric Measurement of Eddy-Current Losses (Kalorimetrische Messung von Wirbelstromverlusten), L. Lehrs. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 443-452, 10 figs. Account of experiments to determine a method of calorimetric measurement of current displacement at high frequency, and difficulties arising therewith. Shows how measurement can be carried out and instruments used, including mirror manometer, transmitter arrangement, and thermocouple.

Eddy Current Losses in Armature Conductors, R. E. Gilman. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 194-196; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1170-1173, 1 fig. Extension to author's paper published in vol. 39, pp. 997-1047, 1920, of Journal; additional formulas are given for cases where transposed coils are used and also methods for quickly estimating increased loss due to eddy currents.

Eddy Current Losses in Twisted Conductors, L. Fleischmann. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1062-1064, 4 figs. Gives method which shows elementary way by which to understand these phenomena.

Insulation. See INSULATION, ELECTRIC, Armatures.

Railway-Motor. Certain Essentials in Dipping and Baking Railway Motor Armatures, H. S. Day. Aera, vol. 13, no. 1, Aug. 1924, pp. 42-47, 3 figs. Certain stages of process must be carried out without deviation from approved practice if best results are to be obtained; practical suggestions that should be valuable to maintenance men.

Reconnecting. Reconnecting Direct-Current Armature Windings—Lap Wound Armatures, A. C. Roe. Power, vol. 59, no. 7, Feb. 12, 1924, pp. 246-247, 10 figs. Two-layer lap winding as used on drum-type armatures; armature-winding diagrams explained; single and double windings; use of equalizer connections and how they are made.

Reconnecting Direct-Current Armatures—Common Mistakes in Connections, A. C. Roe. Power, vol. 59, no. 12, Mar. 18, 1924, pp. 446-447, 5 figs. Effects in changing from right-hand to left-hand winding, or from progressive to retrogressive connection.

Reconnecting Direct-Current Armature—Fractional-Pitch Windings, A. C. Roe. Power, vol. 59, no. 25, June 17, 1924, pp. 983-984, 6 figs. Effects of reducing pitch of armature coils and how chording coils may make it possible to use coils that have been made too short for full pitch.

Reconnecting Direct-Current Armatures—Wave Windings, A. C. Roe. Power, vol. 59, no. 9, Feb. 26, 1924, pp. 331-334, 8 figs. Two-layer wave windings as used on drum-type armatures; comparisons between lap and wave windings; effects on speed and voltage when windings are reconnected.

Rotor Slot Wedges. See ELECTRIC MOTORS, A. C., Rotor Slot Wedges.

Slot-Wound, Skin Effect in. Skin Effect in Slot Wound Conductors, A. Press. Electrician, vol. 92, no. 2381, Jan. 4, 1924, pp. 4-5, 3 figs. Heavisidean solution of A. B. Field's problem, subject to boundary conditions set forth in Physical Rev. article of May 1920, assuming criticized Arnold method of calculating self inductances was true.

Testing. Testing Out Armatures During Rewinding, A. C. Roe. Indus. Engr., vol. 82, no. 8, Aug. 1924, pp. 373-377 and 401, 7 figs. Gives methods of testing hand-wound armatures and order in which tests should be conducted so that various faults and defects may be easily located and quickly eliminated at time they are most likely to occur.

Winding. Armature and Coil Winding From a Conversion Point of View, C. Sylvester. Electricity, vol. 38, nos. 1732, 1733, 1737, and 1741, Jan. 18, 25, Feb. 22, and Mar. 21, 1924, pp. 28-29, 49, 94-95, and 147, 9 figs. Calculations.

Figuring a New Winding for an Old Direct-Current Machine, A. C. Roe. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 757-761, 3 figs. Notes on developing new armature and field windings for d.c. machine when no winding data are available.

Winding, Theory of. A Contribution to the Theory of Direct Current Armature Winding, H. J. S. Heather. World Power, vol. 1, no. 3, Mar. 1924, pp. 158-163. Author seeks to show that formula for any ordinary winding and criteria as to possible construction can be simply and logically determined with help of trigonometrical theorem giving nth roots of unity.

Theory of Direct Current Armature Windings, K. C. Graham. Ry. Elec. Engr., vol. 15, no. 1, Jan. 1924, pp. 20-23, 9 figs. Explains method of locating and remedying trouble and analyzes such theory as is necessary to a complete understanding of method pursued.

Windings, Electromotive Force in. The Armature Field in the Pole Clearance and the Induced Electromotive Force in an Armature Winding (Das Ankerfeld in der Pollücke und die in einer Ankerwindung induzierte EMK), R. Richter. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 67-79, 10 figs. Investigation, based on work by Th. Lehmann, published in earlier issue of same journal.

ARSENIC

Deposits, United States. Arsenic Deposits Near Seattle, Washington, P. C. Stoess. Eng. & Min. Jl.-Press, vol. 118, no. 21, Nov. 22, 1924, pp. 821-822. Notes on mining districts of Snohomish and King counties.

Arsenical Ore Deposits in the United States, R. H. Sayre. Eng. & Min. Jl.-Press, vol. 118, no. 24, Dec. 13, 1924, pp. 929-932, 6 figs. Geological survey of some western prospects and mines.

Production. Arsenic Production from Non-Ferrous Smelting, A. B. Young. Min. & Metallurgy, vol. 5, no. 208, Apr. 1924, pp. 175-178, 1 fig. Anomalous situation regarding arsenic content of ores; effect of impurities on each other; bad effects of arsenic in blast furnace; arsenic difficulties increased by zinc.

Making White Arsenic at Toulon, Nev., George J. Young. Eng. & Min. Jl.-Press, vol. 117, no. 19, May 10, 1924, pp. 757-758, 5 figs. New independent company mines and roasts 15 per cent arsenical ores. Notes on deposit, mining operations, and ore treatment.

ARTILLERY

Fire-Control. The Standardization of Optical Fire Control Instruments, I. C. Gardner. Army Ordnance, vol. 5, no. 26, Sept.-Oct. 1924, pp. 512-514, 2 figs. Reviews history of production of optical instruments during war. Presents a plan for standardization, and gives its advantages. Pub. by permission U. S. Bur. Standards.

Guns. See GUNS.

Matériel. Artillery Matériel, J. B. Rose. Coast Artillery Jl., vol. 61, no. 4, Oct. 1924, pp. 302-312. Résumé of status of development.

Railway. Railway Development Since 1918, G. W. Ricker. Coast Artillery Jl., vol. 61, no. 4, Oct. 1924, pp. 313-333, 11 figs. Account of developments, difficulties and problems during time that railway artillery has been part of United States coast-defense system.

Recoil Mechanisms. Advantages of Hydro-Pneumatic Recoil Mechanisms, D. A. Gurney and W. C. Young. Army Ordnance, vol. 4, no. 22, Jan.-Feb. 1924, pp. 230-233, 3 figs. Greater range and less weight required; standardization; manufacture; service use.

Transport Wagons. Transport Wagons for Medium and Heavy Field Artillery, T. A. Conlon. Army Ordnance, vol. 4, no. 22, Jan.-Feb. 1924, pp. 251-254, 4 figs. Describes German, British, and American types.

ASBESTOS

Industry, Development of. The Development of the Asbestos Industry, 1871-1924. India-Rubber Jl., vol. 68, no. 5, Aug. 2, 1924, pp. 109-113. Review of progress and growth of industry.

Italy. Asbestiferous Deposits at Mount Plebi (Il giacimento amiantifero di Monte Plebi), G. Castelli. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 4, Oct. 15, 1924, pp. 99-100. Discusses preliminary work in Gallura zone of Sardinia, showing sufficient abestos rock to warrant larger operations.

Production and Uses. Asbestos, Its Production and Uses (Asbest, seine Gewinnung und Verwertung). Bergbau, vol. 37, no. 19, Sept. 18, 1924, pp. 528-535. Occurrence, mining, fiber, color, spinning; production of asbestos sheets, paints, slates for roofing, etc.

South Africa. Further Notes on the Asbestos Occurrences Near Kaapsche Hoop, in the Barberton District, A. L. Hall. Geol. Soc. S. Africa—Trans., vol. 26, Jan.-Dec. 1923, pp. 31-49, 4 figs. partly on supp. plates. Detailed geological description.

The Amianthus Asbestos Mine. So. African Min. & Eng. Jl., vol. 35, no. 1708, June 21, 1924, pp. 1139-1140, 2 figs. Discusses important chrysolite deposit in Barberton district near Kaapsche Hoop; gives mining methods and way of testing.

The Asbestos Resources of the Union of South Africa, A. L. Hall. S. African Jl. Industries, vol. 7, no. 11, Nov. 1924, pp. 724-731. Available varieties, distribution and mode of occurrence, local consumption, output, and general outlook of asbestos industry. List of producers. Bibliography.

ASH HANDLING

[See also COAL HANDLING.]

Apparatus for. The Disposal of Ashes in Power Plants, E. K. Scott. Power Engr., vol. 19, nos. 215, 216, and 217, Feb., Mar., and Apr. 1924, pp. 55-56, 90-92, and 145-147, 16 figs. Survey of present practice. Feb.: Trucks and skips; bucket and tray conveyors; scraper and belt conveyor. Mar.: Sluicing ash conveyor.

Boiler Plants. See COAL HANDLING, Boiler Plants.

Conveyors. See COAL HANDLING, Conveyors.

Power Plants. Ash Removing Plants (Entaschungsanlagen), H. Esselbach. Wärme, vol. 47, no. 22, May 30, 1924, pp. 255-256, 3 figs. Describes plants of Roath Power Works in Cardiff and of Underfeed Stoker Co.

See also COAL HANDLING, Power Plants.

ASHES

Coal Recovery from. See COAL, Recovery from Ashes.

ASPHALT

Composition. Composition of Asphalt (De constitutie van asphalt), F. J. Nellensteyn. Chemisch Weekblad, vol. 21, no. 4, Jan. 26, 1924, pp. 42-51. Detailed description of properties, composition, and methods of analysis.

The Constitution of Asphalt, F. J. Nellensteyn. Instn. Petroleum Technologists—Jl., vol. 10, no. 43, June 1924, pp. 311-325. Aims at formation of definition of asphalt as result of researches, and proceeds with synthesis of asphalt-like substances from hydrocarbon and carbon; considers solutions of asphaltenes to be very stable carbon oleosols.

Rock. See ROAD MATERIALS, Rock Asphalt.

Rock, Use for Floors. European Natural Rock Asphalt for Floors, W. H. Tait. Contract Rec.

& Eng. Rev., vol. 38, no. 14, Apr. 2, 1924, pp. 336-338. Reasons for failure of asphalt floors; stresses the exceptionally excellent qualities of European asphalt manufacture.

Roofing, Specifications. United States Government Master Specification for Asphalt for Unsurfaced Built-Up Roofing. U. S. Bur. Standards—Circular, no. 168, July 7, 1924, 10 pp., 3 figs. Specifications for grades, material and workmanship, requirements, methods of inspection, packing and marking, etc.

See also ROOFS, Asphalt.

Sands, Classifications of. Classifying Asphalt Sands by Graphical Method, W. C. D. Haarman. Eng. News Rec., vol. 92, no. 26, June 26, 1924, pp. 1090-1091, 2 figs. Triangular diagrams offering simple and rapid means of classifying sands and proportioning sheet-asphalt mixture.

Statistics, 1923. Asphalt and Related Bitumens in 1923, K. W. Cottrell. U. S. Geol. Surv., no. II:16, 1924, 135-142. Statistics of production, imports and exports, and list of producers.

Status of. The Status of Asphalt. Lubrication, vol. 10, no. 6, June 1924, pp. 61-66. Discusses economic value, determination of quality, refining, and uses of asphalt.

Tar. See TAR, Asphalt.

Waterproofing, Use for. See WATERPROOFING, Asphalt for.

ASSAYING. See ORES, Assaying.

ATMOSPHERE

Physical Structure. The Physical Structure of the Atmosphere, Regarded from the Dynamical Point of View, N. Shaw. Ingenieur, vol. 39, no. 41, Oct. 11, 1924, pp. 807-808. Normal wind can be approximately computed from air pressure and rotation of earth. Variation of temperature with height is fairly uniform all over world and prevailing winds in upper strata of atmosphere are therefore fairly uniform. At a level of about 8 km. density of air is same all over globe throughout year and so are isotherms and isobars (in English).

ATOMS

Atomic Weights. Atomic Weights and Isotopes, T. W. Richards. Chem. Reviews, vol. 1, no. 1, Apr. 1924, pp. 1-40. Methods of determining atomic weights; constancy of atomic weights; precision of Faraday's law; discovery of isotopes; atomic weights and cosmogonic theory. List of references.

Compositeness of. Chemical Combinations, J. Moil. Chem., Met., & Min. Soc. of S. Africa—Jl., vol. 24, no. 7, Jan. 1924, pp. 158-166 and (discussion) 166-167, 15 figs. Discussion on compositeness of atoms.

Compressibility. Compressibility, Internal Pressure and Change of Atomic Volume, T. W. Richards, Franklin Inst.—Jl., vol. 198, no. 1, July 1924, pp. 1-27, 11 figs. Shows that changes of volume occurring when two solids or liquids combine are due to changes of pressure resulting from chemical affinity and cohesion, and that when affinity is greater, volume-change is greater and also compressibility is greater; develops from this methods for determining diameter of atoms in compounds. Bibliography.

Disintegration, Action of γ-Rays on. The action of Gamma-Rays in Atomic Disintegration (Ueber die Rolle der γ-Strahlen beim Atomzerfall), L. Meitner. Zeit. für Physik, vol. 26, no. 3, Aug. 11, 1924, pp. 169-177. It has been found that radio-actinium and actinium X, when they disintegrate giving out alpha-particles, produce typical monochromatic gamma-radiations, as radium has been shown to do; with these two substances large number of monochromatic nuclear gamma-rays have been shown to be produced, instead of single one as in radium; when an alpha- or beta-particle is given out from nucleus of radioactive atom, remainder of nucleus must undergo rearrangement of its constituent parts.

Internal Mechanism. Putting the Atom to Work, Oliver Lodge. Sci. Am., vol. 130, no. 5, May 1924, pp. 306 and 358-359, 10 figs. Discusses attempt to isolate its energy and to find how it may be released for human use.

Isotopy. Isotopy and Isotopes (L'isotopie et les isotopes), Mme. Pierre Curie. Jl. de Physique & le Radium, vol. 4, no. 11, Nov. 1923, pp. 381-412, 4 figs. Isotopy in connection with radioactive elements; positive rays and analysis of crystals; structure of atoms; separation of isotopes.

Kinetic. The Kinetic Atom, Oliver Lodge. Nature, vol. 113, no. 2827, Jan. 5, 1924, pp. 15-17, 3 figs. Evidence for nuclear atom; varieties of possible orbits; effect of ellipticity on spectrum.

Movements in. Simple Cases of Movements under the Effect of the Newton-Coulomb Law of Attraction (Einige einfache Fälle von Bewegung unter der Wirkung der Newton-Coulombschen Anziehung), Alb. Forster. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 11, Nov. 1924, pp. 550-567, 3 figs. Author attacks the proposition of J. J. Thomson set forth in series of articles published in Gen. Elec. Rev. and in Jl. Franklin Inst., that Coulomb law be changed to a different relation; based on simple law of attraction and repulsion evolved by Newton and Coulomb, he examines series of circular and pendular movements along an ellipse, in focuses of which attractive and repulsive mass is found; refers to model proposed by Fajans for designating certain molecular movements.

Periodic Law. The Present Position of the Periodic Law, W. R. Cooper. World Power (formerly Beama), vol. 1, no. 1, Jan. 1924, pp. 18-24, 2 figs. Periodic law of Mendeléeff; discovery of atomic number; atomic structure; why there are fractional atomic weights.

Quantum States. The Probability of Quantum States (Ueber die Wahrscheinlichkeit der Quantenzustände), E. Fermi. Zeit. für Physik, vol. 26, no. 1, Aug. 5, 1924, pp. 54-56. Calculation of equilibrium between quantum states of same atom based on thermodynamic-volume considerations, from which it is concluded that quantum states seldom occur corresponding to greater volume than that given by ordinary statistics. Mathematical paper.

Recent Research on. Electrons, Atoms and Atomic Architecture, G. W. De Tunzelman. Electrician, vol. 92, no. 2384, Jan. 25, 1924, pp. 97-99. Recent work considered and criticized.

Structure of. Building Up and Destruction of the Atom (Atomaufbau und Atomzertrümmerung), M. v. Laue. Zeit des Vereines deutscher Ingenieure, vol. 68, no. 30, July 26, 1924, pp. 769-773, 9 figs. Discusses development up to Bohr's theory of spectral series and present-day views on composition of nucleus of atom.

Some Contemporary Advances in Physics, K. K. Darrow. Bell System Tech. Jl., vol. 3, no. 1, Jan. 1924, pp. 158-178, 13 figs. Deals principally with atomic structure.

Spectroscopy and Bohr's Theory of Atomic Structure, P. D. Foote. Franklin Inst.—Jl., vol. 198, nos. 3 and 4, Sept. and Oct. 1924, pp. 344-363 and 517-540, 15 figs. Consideration of schematic representations of models which are suggested by spectroscopic data.

The Natural and Artificial Disintegration of the Elements, E. Rutherford. Franklin Inst.—Jl., vol. 198, no. 6, Dec. 1924, pp. 725-744. Notes on structure of nuclei of atoms; dimensions of nuclei

and law of force; radioactive evidence; frequency of vibration of nucleus; velocity of escape of hydrogen nuclei; evolution of nuclei.

The Structure of the Atom, W. F. G. Swann. Franklin Inst.—Jl., vol. 197, no. 3, Mar. 1924, pp. 293-321, 6 figs. Discusses theories of atomic structure.

The Transformation of Atoms and the Study of Elements (Atomumwandlung und Elementenforschung), O. Hahn. Zeit. für angewandte Chemie, vol. 37, no. 12, Mar. 20, 1924, pp. 153-158, 7 figs. Basic principle underlying theory of atoms and elements; review of literature and developments relating to theories on structure of chemical compounds and of separate atoms; author points out that theory of core structure of atom is still very obscure.

Theories and Experiments. Outline of the Investigations of the Atom during the Last Decade (Grundragen av det senaste årtiondets atomforskning), A Westgren. Teknisk Tidskrift, vol. 54, no. 13, Mar. 29, 1924, pp. 104-108 (Allmänna Avdelningen), 5 figs. Reports, theories and experiments, particularly those of Ernest Rutherford in Cambridge, Eng.

Theory of the Atom (Ueber Atomtheorie), M. Born. Elektrotechnische Zeit., vol. 45, no. 34, Aug. 21, 1924, pp. 889-897, 7 figs. Summarizes present conception of atoms as kind of planetary systems, including periodic system of elements, fundamental laws of mechanics of the atom, quantum theory, laws of spectra, Bohr theory of the H atom, etc.

AUDIOMETERS. See SOUND, Waves, Photographing.

AUDITORIUMS

Acoustics of. See ACOUSTICS, Auditoriums.

AUTOGENOUS WELDING

[See also OXY-ACETYLENE WELDING.]

Boilers. Autogenous and Electric Welding in Repairing Steam Vessels (Les soudures au chalumeau ou à l'arc électrique appliquées aux réparations des appareils à vapeur), M. L. Cauchois. Associations Françaises de Propriétaire d'Appareils à Vapeur—Bul., vol. 5, no. 16, Apr. 1924, pp. 65-90, 23 figs. Discusses autogenous and electric welding as applied to iron and steel, especially for boilers; tests made on welds by various authorities; faulty welding; micrography.

Proposed Code of Rules to Govern Autogenous Welding on Steam Pressure Boilers. Boiler Maker, vol. 23, no. 9, Sept. 1924, pp. 257-262, 27 figs. Gives results obtained from tests and recommendations covering use of autogenous welding in steam boilers.

Coal-Gas. Welding with Coal Gas (Schweissungen im Leuchtgasfeuer), Fr. Messinger. Wärme, vol. 47, no. 4, Jan. 25, 1924, pp. 31-32, 6 figs. Autogenous welding and cutting; success of complete welds by means of coal gas without welding medium; welding tests to determine welding limit; experiences with welds in coal-gas fire; tests with low-pressure gas, compressed air, and compressed gas.

Definition of. What is Welding? (Was ist Schweissen?), R. Baumann. Wärme, vol. 47, no. 20, May 16, 1924, pp. 223-224. Shows that term "autogenous welding" is incorrect and proposes in its place "fusion."

Gases for. Relative Suitability of Various Kinds of Gas for the Purpose of Autogenous Welding (Ueber die Frage der relativen Eignung der verschiedenen technischen Gasarten für die Zwecke der autogenen Schweissung). Autogene Metallbearbeitung, vol. 17, nos. 15 and 16, Aug. 1 and 15, 1924, pp. 189-192 and 207-208. Calorific value of gaseous fuels and flame temperatures of Co, H, methane, etc.; thermic efficiency of flames; significance of chemical nature of gases for welding.

Safety in. Consideration of Safety and Economy in New Autogenous Welding Plants (Sicherheitliche und wirtschaftliche Gesichtspunkte bei neuen autogenen Schweissanlagen). Bergbau, vol. 37, no. 29, Dec. 4, 1924, pp. 727-731, 6 figs. Discusses safety as fundamental condition in construction of acetylene apparatus. Describes manufactures of Messer & Co., Frankfort.

AUTOMOBILE ENGINES

Air Cleaners. Air-Filters, L. L. Dollinger. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 66-68, and (discussion) no. 6, Dec. 1924, pp. 539-541. Effect of road dust and grit on cylinders and valves; benefits derived from filtering air; requirements of a filter.

California Air-Cleaner Tests, 1924 Series, A. H. Hoffman. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 140-148, 8 figs. Details of work of Univ. of Cal. Agricultural Experiment Station in continuation of 1922 tests, method of testing cleaners that cannot be tested by 1922 method, determining how much dust an auto or truck encounters in service, how air cleaners affect rate of engine wear; gives tabular summary of results.

Motor Vehicle Makers Give Increased Attention to Air Cleaners, W. L. Carver. Automotive Industries, vol. 50, no. 4, Jan. 24, 1924, pp. 180-183, 7 figs. Five passenger cars at New York show carried these units as standard equipment; claimed to eliminate various troubles by preventing dust from entering engine with carburetor air; four different types for car, truck, and bus use.

Recent Observations of Air-Cleaning Devices, C. P. Grimes. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 63-65, 1 fig., and (discussion) No. 6, Dec. 1924, pp. 541-543. Author summarizes his experiences and conclusions covering last 3 years. Reasons and experiences leading up to recommendation of self-ejecting centrifugal dry air cleaner.

Testing of Air-Cleaners, A. B. Squyer. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 33-37, 5 figs., and (discussion), no. 6, Dec. 1924, pp. 553-555. Requirements of a good air cleaner are maximum efficiency, minimum of attention from operator and minimum power-loss. Deals with development of laboratory methods to determine relative values of various air cleaners as such, especially first requirement, maximum efficiency.

Air-Cooled. The Future of the Air-Cooled Car, V. W. Pagé. Sci. Am., vol. 130, no. 1, Jan. 1924, pp. 22-23 and 71, 7 figs. Engineering and operating facts that call for its most serious consideration.

Anti-Detonator for. See AUTOMOBILE FUELS, Anti-Knock Compound.

Assembling Fixture. Special Fixture Used in Assembling Packard Cylinder Block to Crankcase. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 564-565, 3 figs. Preserves alignment standards of connecting rods, pistons, and rings previously installed; device is operated pneumatically and, by simplifying work, makes possible more rapid production.

Bagnulo. Oil Engines for Motor Vehicles, with Special Regard to the Bagnulo Engine (Oelmotoren für Kraftfahrzeuge unter besonderer Berücksichtigung des Bagnulo-Motors), L. Hausfelder. Wirtschafts-Motor, vol. 6, no. 2, Feb. 1924, pp. 1-8, 5 figs. Discusses different types of oil engines used in automobiles, and describes Bagnulo en-

gine as example of satisfactory solution of problem of automobile engine for heavy oils.

Will Surface-ignition Solve Automobile Oil-engine Problems? Oil Engine Power, vol. 2, no. 2, Feb. 1924, pp. 76-78, 2 figs. Describes Bagnulo heavy-oil hot-bulb type of surface-ignition automobile engine; invented by an Italian, and sponsored by Siemens-Schuckert Werke and Allgemeine Elektricitaets Gesellschaft of Berlin; that it requires only 20 lb. air per lb. of fuel, weighs only 18 lb. per b. hp., and regularly consumes 29 deg. B. fuel oil without coking up bulb and at rate of 0.58 lb. per b. hp-hr. is claimed for it.

Balancing. Balance of the Cadillac V-63 Engine, E. W. Seaholm. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 70-73, 5 figs. Points out that Gen. Motors Research Laboratories has investigated possibility of counteracting couples connected with this type of shaft and has arrived at solution through employment of compensating weights properly proportioned and disposed along crankshaft; this method of balancing had its first application in 8-cylinder engines built by Cadillac Motor Car Co.

Balancing of Automobile Engines, H. S. Rowell. Automobile Engr., vol. 14, no. 188, Apr. 1924, pp. 119-123, 17 figs. Results of author's researches, some of which are believed to be new and useful; deals with inertia balancing; rotating parts; reciprocating parts; connecting rods. Includes appendices on harmonic balancing, vee engines, and connecting-rod inertia.

Engine Balancing Calculations, M. Platt. Automobile Engr., vol. 14, nos. 192 and 193, Aug. and Sept., 1924, pp. 243-249 and 275-281, 42 figs. Discusses balance of rotating masses; crankshafts; engine-balancing calculations. Appendices. Bibliography.

Practical Balancing of Engine Components, A. A. Bull. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May, 1924, pp. 527-531, 9 figs. Discusses vibrations either felt or heard in car which are result of lack of balance. From a production standpoint, influence of mechanical unbalance of parts and variation in their weight that may create different unbalanced forces are of principal concern; specific instances. Commercial balancing of crankshafts, flywheels, clutches and propeller-shaft assemblies; six- and eight-cylinder engine balance; vibration-test results, in terms of actual measurement on dynamometer and in car.

Practical Methods of Engine-Balancing, L. L. Roberts. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 452-456, 8 figs. Author divides into three major groups units of automobile that require particular attention and treatment to assure smooth-running mechanism and gives details of actual methods employed by Packard Motor Co. to balance parts that constitute each group.

The Harmonic Balancer, J. N. Morris. Autocar, vol. 52, no. 1478, Feb. 15, 1924, pp. 283-284, 8 figs. Description of device originally introduced by F. W. Lanchester for obtaining, in a 4-cylinder engine of orthodox type, perfection of balance attainable in 6-cylinder engine, and its action.

See also Inherent Vibration and Balance.

Carbureting and Distributing System. New Device Enriches Charge for High Speed and Heavy Pull, and Leans It Otherwise, W. L. Carver. Automotive Industries, vol. 51, no. 25, Dec. 18, 1924, pp. 1049-1050, 1 fig. Describes new carbureting and distributing system, comprising, in addition to usual carburetor, modified intake and exhaust manifolds and special auxiliary air valve which is controlled by vacuum in intake manifold and also mechanically through cam on stem of throttle valve.

Carburetors. See CARBURETORS.

Connecting Rods, Light-Alloy. See ALLOYS, Light.

Constant-Compression. Economy of Fuel Attained by Means of Constant Compression Engine. Automotive Industries, vol. 50, no. 24, June 12, 1924, p. 1278, 1 fig. Gas mixture and air are drawn in successively so that they will remain on different levels of combustion chamber, and so that stratification replaces turbulence of charge in Burtnett 4-cycle engine.

Construction. Special Problems in the Construction of Medium- and High-Pressure Automobile Engines (Sonderaufgaben beim Bau von Mittel- und Hochdruck-Kraftfahrzeugmotoren), F. E. Bielefeld. Wirtschaftsmotor, vol. 6, no. 7-8, Aug. 25, 1924, pp. 9-12, 7 figs. Discusses question of weight, least weight without reducing safety and life; high number of revolutions; further development of two-stroke engine.

Cooling Systems. Engine-Cooling Systems and Radiator Operating Characteristics, N. S. Diamant. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 396-406, 14 figs., and (discussion), vol. 15, no. 3, Sept. 1924, pp. 229-232. Quantitative comparison of air, water, and oil-cooled cylinders as it relates to subject of heat transfer and temperature drop; comprehensive discussion of radio-condenser type of cooling is given under headings of steam cooling systems and characteristics, cooling capacity of radiators used to condense steam, and present state of development; discussion of performance of operating characteristics of radiators from viewpoint of car, truck, or tractor designer.

Latest Cooling System Employs Small Gear Pump with ⅝ in. Discharge Tube, H. Chase. Automotive Industries, vol. 51, no. 18, Oct. 30, 1924, pp. 770-771. Functions much like steam boiler, but water is cooling medium; if jacket with free outlet and no pockets is used overheating is impossible; system is being tried on three different passenger-car engines in experimental service.

Corrosion. Undue Wear of Engine Parts Is Caused by Rust. Automotive Industries, vol. 50, no. 18, May 1, 1924, pp. 956-958, 2 figs. Three hypotheses analyzed in research work conducted in Gen. Motors Corpn., namely acid, oxide, and electrolytic theory, all of which agree that presence of moisture is necessary.

Crankcase Drainage Facilities. Crankcase Drainage Facility and Oil-Pump Capacity, T. A. Waerner. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 260-262. Discusses means of reducing percentages of fuel dilution as follows: (1) greater accessibility for draining engine-lubricating oil; (2) greater accessibility for cleaning vital parts before reassembling, after draining used lubricating oil; and (3) more adequate consideration of crankcase oil-sump design.

Crankcase-Oil Dilution. A Possible Solution of the Crankcase-Oil Dilution Problem, I. L. Anderson. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 43-46, 6 figs. Describes method which consists of removing gasoline from crankcase by ventilation; apparatus used and results of tests.

Consumption and Dilution of Automobile Engine Oils. Lubrication, vol. 10, no. 6, June 1924, pp. 66-72, 13 figs. Description of dynamometer apparatus and test routine; discusses dilution, lubricating system, oil viscosity requirements, of road tests, and oil consumption.

Crankcase-Oil Dilution, E. F. Hallock, Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 57-62. Presents tabular data to show how end points have risen since 1910, together with data showing effects of various percentages of fuel dilution with relation to Saybolt viscosities

and pour points of high-grade oils; point contamination, not dilution, necessitates oil drainage; use of heavier-bodied oils decried; how to avoid crankcase dilution, and oil sluding; proper oil specification.

Determination of Dilution of Crank-Case Oil, H. H. Knoch, P. A. Crosby and R. R. Matthews. Indus. & Eng. Chem. vol. 16, no. 11, Nov. 1924, p. 1153. Shows results of using vacuum distillation as method of determination.

Dilution of the Crank Case Oil of Automotive Engines, C. M. Larson. Armour Engr., vol. 15, no. 2, Jan. 1924, pp. 53-54 and 63, 6 figs. Causes and prevention; results of tests; describes Lilut-O-Meter, and Vis-Gage, instruments for testing life of crankcase oil.

Factors Affecting the Rate of Crankcase-Oil Dilution. J. O. Eisinger. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 69-74, 11 figs., and (discussion) No. 4, Oct. 1924, pp. 333-336. Progress in Coöperative Fuel Research since last report was presented to Soc. Automotive Engrs. Shows that temperature of jacket water has a marked influence upon rate of dilution, and that this influence is due to difference in rate at which diluent is added to or eliminated from oil-film. Gives evidence demonstrating that under certain conditions diluent may be eliminated from oil at a fairly rapid rate, and discusses bearing that this has upon posibility of an equilibrium state being reached. Other factors discussed with reference to their probable influence upon rate of dilution.

The Danger Point of Dilution. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 117-121. Twenty-six makers report views on dilution factors and propose remedies.

The Serious Evils of Crankcase-Oil Dilution, W. F. Parish. Automotive Mfr., vol. 65, no. 11, Feb. 1924, pp. 24-25. Effect of dilution on wear of motor-vehicle engines; statistics of recent replacements; practical improvements in methods; preventing contamination.

Winter Tests Show Greater Dilution with Heavy Fuels, J. A. C. Warner. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 151-161, 10 figs. Report on results of winter tests by Bur. of Standards; discusses results of analyses of fresh crankcase oils and dilution results before making comparison between those obtained under summer and under winter condition; notes on dilution vs. mileage; distillation of composite oil samples; comments upon crankcase-oil consumption.

Crankcase Oil, Rectification of Diluted. Rectification of Diluted Crankcase-Oil, R. L. Skinner. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 51-59, 9 figs., and (discussion) no. 4, Oct. 1924, pp. 340-343. Traces engineering development of a rectifying device and system designed to combat crankcase-oil dilution problem. Gives temperatures prevailing throughout system when it is in operation. Amount of oil handled by device in ordinary service. Describes comparative tests to determine engine wear with and without device.

Crankcase Oils, Water in. Water in Crankcase Oils, A. L. Clayden. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July, 1924, pp. 47-50, 3 figs., and (discussion) no. 4, Oct. 1924, pp. 329-333. Effect of using an emulsifying oil; amounts of water actually deposited because of cylinder-wall condensation; effects on lubrication; determination of water-deposition rate.

Crankcase. See CRANKCASES.

Crankshaft. See CRANKSHAFTS, Balancing; Forging; Machinery.

Cylinder Blocks. See MACHINING METHODS, Automobile Cylinder Blocks.

Cylinders. See IRON CASTINGS, Automobile Cylinders.

Cylinders, Machining. See CYLINDERS, Automobile, Machining.

Cylinders, Wall Coating of. New Substance for Coating Cylinder Walls Said to Promote Fuel Economy. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, pp. 680-681, 2 figs. Locomobile Co. adopts process called kataliting which is claimed to accelerate combustion and thus render more efficient conversion of thermal to mechanical energy; test results.

Design, Influence of Fuel on. Fuels and Engine Evolution, W. R. Ormandy. Motor Transport (Lond.), vol. 30, no. 1030, Nov. 24, 1924, pp. 613-614. How present-day fuel conditions and requirements are likely to influence engine design.

Detonation Control. Control of Detonation, G. A. Young and J. H. Holloway. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 315-318, and (discussion) vol. 15, no. 3, Sept. 1924, pp. 235-237. Discusses methods of controlling temperature of charge before and after mixture enters combustion chamber, and before normal ignition occurs; results of tests are that, when care is exercised in maintaining mixture, spark plugs, valves and combustion chamber at proper temperature, compression pressure of 125 lb. per sq. in. can be used without detonation by addition of small amount of anti-knock compound to fuel with enough increase in efficiency of engine to warrant additional expense.

Developments. Automobile Engines: Evolution, Improvements, and Tendencies (Le moteur d'automobile: Evolution, perfectionnements, tendances), Martinot-Lagarde. Technique Moderne, vol. 16, nos. 19 and 20, Oct. 1 and 15, 1924, pp. 629-632 and 669-675, 10 figs. Discusses fuels, two- and four-stroke engines, compressions, form of explosion chambers, speed of rotation, construction of a normal engine, and present state of automobile construction.

Dorner. See Heavy-Oil.

Eight-Cylinder V. Smooth Running and Mass Balancing in Eight-Cylinder V Engines with Symmetrical and Asymmetrical Crankshafts (Gleichgang und Massenausgleich bei symmetrischer und unsymmetrischer Kurbelwelle), H. Schrön. Motorwagen, vol. 27, nos. 33 and 36, Nov. 30 and Dec. 31, 1924, pp. 612-616 and 739-744. Comparison of standard shaft with special constructions (Cadillac and others) with regard to uniform torsional moment and mass effects; numerical examples.

Eight-in-Line. Excelsior Offers New Eight-in-Line Overhead Valve Engine. Automotive Industries, vol. 50, no. 13, Mar. 27, 1924, pp. 715-717, 4 figs. Product of Chicago concern has nine-bearing crankshaft, aluminum rods and pistons, and high-pressure lubricating system; it reported to develop 93 b. hp. at 2500 r.p.m.; bore is 3⅜ in. and stroke 4½ in.

8-in-Line Engine Is Latest Product of Lycoming. Automotive Industries, vol. 50, no. 20, May 15, 1924, pp. 1066-1067, 4 figs. Cylinders are cast in single block and are of L-head type; dimensions will be varied for particular cars, but on first models built bore is 3⅛ in. and stroke 4¼ in.; pistons are of cast iron; inlet and exhaust manifolds are combined.

Falls Eight-in-Line Has Crankcase and Cylinders Cast Integral. Automotive Industries, vol. 50, no. 22, May 29, 1924, pp. 1182-1183, 2 figs. Valve in head-type engine has five-bearing crankshaft lubricated by pressure, integral inlet manifold, and two additional cylinders have same bore and stroke as six of same make.

The First German Straight Eight Has Aluminum Engine. Automotive Industries, vol. 50, no.

21, May 22, 1924, pp. 1111-1115, 8 figs. New Hansa-Lloyd features include fan blades on flywheel to discharge smoke and fumes from engine underneath chassis, novel method of venting crankcase, and dummy radiator built to give effect of V-type, but which has flat core.

Excelsior. See Eight-in-Line.

Exhaust Gases, CO in. See CARBON MONOXIDE, Automobile Exhaust Gases in.

Falls. See Eight-in-Line.

Fins, Cooling Capacity of. How to Determine the Cooling Capacity of Fins on Crankcase or Engine, C. B. Dicksee. Automotive Industries, vol. 51, no. 4, July 24, 1924, pp. 206-210, 11 figs. Substitution of copper for cast iron or steel does not yield great increase in heat dissipation unless number of fins is multiplied and their thickness decreased.

Fuel-Feeding Apparatus. Magnetically Operated Bellows Pump Used as New Fuel Feeding Device, D. Blanchard. Automotive Industries, vol. 51, no. 21, Nov. 20, 1924, pp. 890-891, 3 figs. Device known as Autopulse magnetic fuel pump operates off storage battery on same principle as electric bell; is mounted directly on carburetor and is said to maintain full supply regardless of grade or temperature.

Tests with Fuel-Feed Apparatus (Einige Versuche mit Brennstoff-Förderapparaten), R. Conrad. Motorwagen, vol. 27, no. 5, Feb. 20, 1924. pp. 65-75, 16 figs. Measurements results with underpressure apparatus and with a combined undepressure and overpressure suction apparatus.

Fuel Heat-Loss Elimination. How to Get the Most Out of the Gasoline You Pay for, G. W. Jones and A. A. Straub. Automotive Industries, vol. 51, no. 4, July 24, 1924, pp. 212-213, 1 fig. Average motor vehicle wastes 30 per cent of heat value of fuel used. Changing from low- to higher-grade fuel and use of air preheater requires readjustment of carburetor.

Fuels. See AUTOMOBILE FUELS.

Fuels and Oils, Effects of. Laboratory Tests Show Effects of Different Fuels and Oils on Engine Performance. Automotive Industries, vol. 51, no. 14, Oct. 2, 1924, pp. 608-610, 3 figs. Dynamometer laboratory of The Texas Co. in Long Island City given over to research on performance and engine wear. Nature and arrangement of testing equipment.

Godet-Vareille. A Diminutive "Six." Autocar, vol. 52, no. 1492, May 23, 1924, pp. 935-936, 6 figs. Six-cylinder 745 c.c. Godet-Vareille engine; outstanding features are positive valve operating mechanism, a supercharger, distinctive type of cylinder construction, and use of roller and ball bearings.

Foreign Maker Increases Engine Speed and Decreases Piston Displacement, W. F. Bradley. Automotive Industries, vol. 50, no. 23, June 5, 1924, pp. 1225-1226, 3 figs. Godet & Vareille (Paris) 45.4-cu. in. six incorporates novel jacket construction, built-up crankshaft with roller bearings on crankpins and supercharger; cylinders are cast separately; brakes are on front wheels and gear-set only.

Hansa-Lloyd. See Eight-in-Line.

Heavy Oil. A New Heavy Oil Automobile (Ein neuer Schweröl-Kraftwagen), R. C. V. Gorrissen. Allgemeine Automobile-Zeitung, vol. 25, no. 47, Nov. 22, 1924, pp. 19-20, 3 figs. See also Wirtschaftsmotor, vol. 6, no. 11, Nov. 25, 1924, pp. 6-7, 1 fig. Particulars of Dorner engine for heavy oils; fuel consumption 275 grams per hp-hr., remaining proportional to r.p.m., 400-1400 and 1800 maximum.

Heavy-Oil Engines for Vehicles with Special Reference to Economy (Schweröl-Motoren für Fahrzeuge unter besonderer Berücksichtigung ihrer Wirtschaftlichkeit), F. E. Bielefeld. Wirtschaftsmotor, vol. 6, no. 5, May 25, 1924, pp. 3-15, 34 figs. Discusses low-pressure carburetors, hot-bulb engines, Diesel engines, atomizing and injection of fuel; compares various types of engines, their advantages and disadvantages.

The Thermokrat System of Using Heavy Oil in Internal-Combustion Engines (Schweröl betrieb in Verbrennungsmotoren "System Thermokrat"), H. Hardt. Allgemeine Automobil-Zeitung, vol. 24, no. 51-52, Dec. 22, 1923, pp. 23-24, 2 figs. Describes crude-oil ignition system which is said to give perfect satisfaction for use in automobile engines in summer and winter.

See also Bagnulo.

Ignition. See IGNITION, Automobile Engines.

Inherent Vibration and Balance. Inherent Vibration and Inherently Balanced Engines, D. Ferguson. Rochester Engr., vol. 3, no. 6, Dec. 1924, pp. 104-106, 2 figs. Discusses inherent out-of-balance condition of 4-cylinder vertical engines.

Lubricants for. See LUBRICATING OILS, Automobile-Engine.

Lubricants, Frictional Losses Due to. Engines for Oil versus Oil for Engines. Soc. Automotive Engrs. Jl., vol. 14, no. 3, Mar. 1924, pp. 307-314, 2 figs. Contains following articles: Mechanical Friction as Affected by the Lubricant, L. H. Pomeroy; The Function of Lubricants, A. L. Clayden.

Lubrication. Engine Lubrication for Automobiles and Boats (Zur Schmierung der Motoren für Land- und Wasserfahrzeuge), Praetorius. Motorwagen, vol. 27, nos. 25 and 27, Sept. 10 and 30, 1924, pp. 441-448 and 477-483, 21 figs. Describes various types of lubricating systems, including that of Daimler, Benz, N. A. G., Dirci-Kardan, Maybach, and other engines.

Some Experiments in the Lubrication of Commercial-Vehicle Engines, H. D. Nickinson. Automobile Engr., vol. 14, no. 185, Jan. 1924, pp. 24-29, 12 figs. Record of commercial tests, carried out in order to ascertain if there is any difference in results obtained when using different brands of lubricating oils for internal-combustion engines, and to see if, for commercial work, it is good policy to buy expensive oil, or otherwise.

Lycoming. See Eight-in-Line.

Machining Methods. The Production of Rickenbacker Motor Parts, H. Campbell. Am. Mach., vol. 61, no. 16, Oct. 16, 1924, pp. 609-612, 11 figs. How cylinders are bored, reamed, and ground; babbitting connecting rods; grinding pistons; lapping piston pins and rings; utilizing power generated on test block.

See also MACHINING METHODS, Automobile-Engine Parts.

Magnetos. See MAGNETOS.

Manifolds. Fundamental Improvements in Manifold Design, A. M. Dean, J. W. Swan and C. A. Kirkham. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 139-147, 13 figs., and (discussion) June, pp. 602-607, 3 figs. Points out shortcoming of present manifolds and describes principle of Swan manifold, based on equal distribution of wet-fuel mixtures in exactly same ratio as that delivered to manifold by carburetor; advantages claimed for manifold of this type.

Hot Spot Temperature Requirements Determined by Purdue Research. Automotive Industries, vol. 50, no. 3, Jan. 17, 1924, pp. 120-123, 7 figs. Results of tests carried out at Purdue Univ. by C. S. Kegerreis and O. C. Berry to determine temperatures required to vaporize present-day fuel by means of so-called hot-spot manifold, and temperatures available in exhaust under different running conditions.

Intake-Manifold Distribution, H. W. Asire. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 387-395, 22 figs. Investigation to determine following questions: (1) how bad is distribution; (2) how do different types of manifold compare; (3) why is liquid distribution in some manifolds poor; (4) how can trouble be corrected.

Manufacture. Unusual Tool Grouping Lowers Cost of Nash Engine Production. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 559-563, 14 figs. Extra operations resulting in superior finish are made possible on this account; many special machines are employed; cylinders are bored three times, reamed once and honed; 600 blocks can be completed without renewing stones.

Mercedes. Sweeping Changes Made in New Six Cylinder Mercedes, P. M. Heldt. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, pp. 845-847, 2 figs. All six cylinders and top half of crankcase made of single aluminum casting; detachable cylinder heads contain valves operated from overhead camshaft; Root-type supercharger used.

Motor-Bus. See MOTOR BUSES, Engines.

Motor-Truck. See MOTOR TRUCKS, Engines.

New York Show. Distinct Progress Shown in Engine Design, A. Ludlow Clayden. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 61-64, 8 figs. Greater output per cu. in. of piston displacement secured; power plants are superior to those of year ago; larger bearing areas and lighter stresses have increased durability.

Oil Aerator and Filter. New Device Designed to Remove Water, Gas and Dirt from Lubricating Oil. Automotive Industries, vol. 51, no. 25, Dec. 18, 1924, pp. 1052-1053, 1 fig. Fuel diluent and water are evaporated in heating element while other foreign matter is filtered out; device is known as Kingston oil aerator and filter tank.

Oil Consumption and Dilution. Engine-Oil Consumption and Dilution, N. MacCoull. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July, 1924, pp. 93-100, 15 figs., and (discussion) no. 4, Oct. 1924, pp. 337-340. First results of tests made by Texas Co., New York City, on five 7½-ton trucks during regular course of business deliveries. Curves plotted from data obtained. Details of dynamometer tests. Description of dynamometer apparatus and engine used, and analysis of result of wear of test engine.

See also Crankcase-Oil Dilution.

Oil Rectifiers. Rickenbacker Incorporates Skinner Rectifier in All New Models. Automotive Industries, vol. 50, no. 20, May 15, 1924, pp. 1086-1087, 2 figs. Oil drawn from around piston by inlet suction is subject to distillation process by hot exhaust gases, fuel driven off being returned to intake manifold.

Pistons. See PISTONS.

Powell. Powell Engine May Prove to be Epochal Design, M. A. Hall. Automotive Mfr., vol. 66, no. 9, Dec. 1924, pp. 5-7, 2 figs. Novel arrangement of crankshaft and connecting rod doubles stroke, carries combustion to end, producing marked increase in power and economy.

Radiator Non-Freeze Liquid. Honey as Anti-Freeze for Automobile Radiators, T. P. G. Shaw and G. L. Robertson. Can. Chem. & Metallurgy, vol. 8, no. 3, Mar. 1924, pp. 63-64. Discussion from standpoint of viscosity at low temperatures and crystallization-point angles, giving results of experiments.

Radiators. Constructing Automobile Radiators, Chas. O. Herb. Machy. (N. Y.), vol. 30, no. 6, Feb., 1924, pp. 454-459, 13 figs. Building up tubular radiator cores of flat-fin type from brass stampings and tubes.

New McCord Radiator Core Stamped from Ribbon Brass. Automotive Industries, vol. 50, no. 20, May 15, 1924, pp. 1084-1085, 4 figs. Entire structure with integral fins is built up by means of progressive multiple die which forms tubes that project from strips running continuously through press; tinned sections are stacked, forced together, and baked to sweat all joints.

See also Cooling Systems.

Simson. Small High Speed Engine Used in New German Car, B. R. Dierfeld. Automotive Industries, vol. 50, no. 13, Mar. 27, 1924, pp. 726-730, 5 figs. Simson car has 4-wheel brakes, connected diagonally in pairs; 4-cylinder power plant is overhead valve type, carries two camshafts, and has two inlet and two exhaust valves for each cylinder; wheelbase is 118 in.

Spark Plugs. See SPARK PLUGS.

Specifications. American Stock Engine Specifications. Motor Transport (N Y), vol. 29, no. 12, Jan. 15, 1924, p. 415. Also Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 442-445. Specifications of the different makes for buses, trucks, tractors, passenger cars, and rail passenger cars.

Starting, Cold-Weather. Danger of Scuffed Pistons and Oil Dilution Reduced by Gasoline Preheating Devices, P. M. Heldt. Automotive Industries, vol. 51, no. 22, Nov. 27, 1924, pp. 928-933, 10 figs. In starting a car cold only most volatile portions of present-day fuels form ignitable mixtures; flooding engine is necessary unless preheating arrangement is provided; describes several types of electric primers.

Superchargers. Automobile Superchargers, D. Gregg. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July, 1924, pp. 38-39, 1 fig. Determination of supercharger capacity. Engine power-output comparisons. Fuel consumption; power developed.

Supercharger Permits Use of Smaller Engines with Surplus Power, P. M. Heldt. Automotive Industries, vol. 50, no. 25, June 19, 1924, pp. 1329-1332. Experience gained with airplane and racing engines shows that supercharger can be used to increase speed at which horsepower curve peaks.

Superchargers. Autocar, vol. 53, no. 1505, Aug. 22, 1924, p. 3, 322, 2 figs. Explains type of blower used for most modern racing engines.

Supercharging. Supercharging at Low Speeds. Autocar, vol. 53, no. 1519, Nov. 28, 1924, pp. 1103-1106, 6 figs. Improving top gear performance and acceleration of a touring car. Actual results of careful tests on road and track.

Thermostat for. See THERMOSTATS, Automobile.

Twin-Cylinder. A New Twin-Cylinder Engine (Ein neuer Zwillingsmotor). Motor u. Auto, vol. 20, no. 23, Dec. 10, 1923, pp. 200-201, 3 figs. Describes engine developed by J. Schneeweiss, which has detachable cylinder heads, and suspended valves of maximum cross-section for rapid and complete charge and scavenging of cylinders.

Two-Cycle. Two-Cycle Engines (Dolf, Bekamo, Garelli), C. Hanfland. Motorwagen, vol. 27, no. 14, May 20, 1924, pp. 239-242, 13 figs. Describes three types of 2-cycle engines, namely, the Dolf, Bekamo and Garelli engines.

Two-Cylinder. Two-Cylinder Sport Plane Engine Is Built to Morehouse Design, G. D. Angle. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 342-343, 2 figs. Light weight per hp. with rugged conventional construction said to be combined in new 3x3-in. air-cooled unit which weighs under 50 lb.; has roller bearings on big ends of connecting rods.

Two-Stroke, Rattle in. Two-Stroke Engine Rattle, G. Funk. Automobile Engr., vol. 1, no.

192, Aug. 1924, pp. 235-236, 5 figs. Examination of its cause and remedy.

V-Type Four-Cylinder. V-Type Four Cylinder Engine Permits Compact Design, P. M. Heldt. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 337-339, 6 figs. Difficult problems involved in balance; cylinders may be placed opposite to one another or staggered; two crankshaft arrangements are possible with latter construction; size of angle determines irregularity in sequence of explosions.

White-Wall. The White-Wall Engine. Autocar, vol. 53, no. 1500, July 18, 1924, p. 116, 2 figs. Interesting air-cooled, four-cylinder two-cycle motor, with special features of scavenging, fuel charging, and exhaust extraction.

Willys-Knight. Willys-Knight Adds Lanchester Balancers and Increases Engine Torque, D. Blanchard. Automotive Industries, vol. 51, no. 10, Sept. 4, 1924, pp. 435-436, 2 figs. Unbalanced rotating weights located in bottom of crankcase compensate for secondary unbalanced forces on reciprocating masses. Valve timing changed and compression increased.

Wisconsin Six. Latest Wisconsin Six designed to Meet Exacting Demands of Bus Service, W. L. Carver. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, pp. 848-849. New engine of 4½-in. bore and 5-in. stroke develops 105 hp. at 2400 r.p.m.; overhead valves are operated from camshaft in crankcase; drive for compressor and large generator provided.

AUTOMOBILE FUELS.

[See also INTERNAL-COMBUSTION ENGINES, Fuels.]

Alcohol. See Alcohol-Gasoline; Benzol-Alcohol; Gasoline-Alcohol.

Alcohol-Gasoline Mixtures. Alcohol-Gasoline Mixtures, A. C. Zimmerman, U. S. Air Service Information Circular, vol. 5, no. 450, Mar. 1, 1924, 3 pp., 5 figs. Investigation of properties of mixtures of aviation gasoline and 198-proof alcohol which has been denatured with one per cent of aviation gasoline.

Anti-Knock Compounds. A Suggested Mechanism for Anti-knock Action. G. L. Wendt and F. V. Grimm. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 890-893, 1 fig. Experiments show that tetraethyl lead and other anti-knock compounds actually have marked effect in recombining gaseous ions at ordinary pressures and temperatures while knock inducers similarly tested have no effect.

Tetra-Ethyl Lead as an Anti-Detonator in High-Compression Engines, H. K. Thomas. Automobile Engr., vol. 1, no. 194, Oct. 1924, pp. 308-311, 9 figs. Results of author's experiments.

Atomizing. On Atomizing of Liquid Fuels (Ueber die Zerstäubung flüssiger Brennstoffe), M. Kuehn. Motorwagen, vol. 27, nos. 19, 28, 29, 34, and 35, July 10, Oct. 10, 20, Nov. 30, and Dec. 10, pp. 326-330, 499-505, 519-529, 616-624, and 650-657, 31 figs. Discusses relation between atomization and combustion; methods for determining size of droplets and small particles. Oct. 10: Testing equipment. Oct 20: Fuels tested; how spray tests were carried out. Nov. 30: Measurements of quantity of flow. Dec. 10: Critical study of experimental results.

Benzine. Rational Standardization of Qualities of Motor Benzine, L. G. Gurvie. Petroleum & Oil-Shale Industry (Russian), vol. 6, no. 2, 1924, pp. 290-296. Deals with temperature at which benzine begins to boil, separate fractions, homogeneity of benzine composition, chemical nature of benzine hydrocarbons, and mixtures of benzine with other combustibles. (In Russian.)

Benzol. See BENZOL.

Benzol-Alcohol. The New Benzol-Alcohol Fuel 20 + 80 (Der neue Benzolspiritus 20 + 80). Allgemeine Automobil-Zeitung, vol. 25, no. 46, Nov. 15, 1924, p. 13. Discusses new fuel, a state monopoly, and its management.

Conveying. Experiments with a Vacuum Conveying Apparatus for Large Conveying Heads at Low Vacuum (Versuche mit einem Unterdruck-Förderapparate für grosse Förderhöhe bei geringem Vacuum), R. Conrad. Motorwagen, vol. 27, no. 19, July 10, 1924, pp. 330-334, 7 figs. Describes vacuum apparatus by Hemrich & Ratzel, Mahlsdorf-Berlin, for use in automobiles, which has minimum of size and weight, acts without levers and without springs.

France. Automobile Fuel Problem from the French Point of View (Le Problème des carburants du point de vue français), A. Mailhe. Technique Modern, vol. 16, no. 22, Nov. 15, 1924, pp. 773-781. Discusses petroleum, synthetic petroleum, shale oils, lignite oils, vegetable oils, alcohol, and products of coal carbonization. Bibliography.

Crisis of Automobile Fuels and Remedies Proposed (La crise des carburants et les remèdes proposés), M. Travers. Société Industriel e de l'Est—Bul., no. 173, Apr.-May-June 1924, pp. 31-68, 2 figs. Discusses French situation, oils available, cracking process, Bergius process, hydrogenation by means of nascent hydrogen, synthesis of liquid hydrocarbons starting from $CO + H$, CH_4, etc., hydrogenation of naphthalene, etc.

Economic Considerations as to the Future of Artificial Liquid Fuels in France (Considérations économiques sur l'avenir des combustibles liquides artificiels en France), M. DeConinck. Chaleur et Industrie, vol. 5, no. 50, June 1924, pp. 269-276. Discusses gasoline problem, especially in connection with coke; manufacture of liquid hydrocarbons by fixation of hydrogen on organic fossil materials; hydrogenation of solid fuel, etc.

The Automobile Fuel Problem. Makhonine's Solution. (Le problème du carburant: La solution de M. Makhonine). A. Baule. Technique Modern, vol. 16, no. 23, Dec. 1, 1924, pp. 825-827. Details of new process for producing fuel from heavy oils, using up heavy oils completely, with which any carburetor may be used.

Gasoline. See Alcohol-Gasoline; Gasoline-Alcohol Mixture; GASOLINE.

Gasoline-Alcohol Mixture. Bench Experiments on Mixtures of Alcohol and Heavy Motor Fuels (Essais au banc des melanges alcool + essences lourdes), O. W. Watson and W. R. Ormandy. Chimie & Industrie, special no., May 1924, pp. 276-280, 5 figs. Experiments show that addition of alcohol causes large increase in proportion volatile below 90 deg., and raises curve during whole course of distillation; increased volatility at 90 deg. doubtless improves running of engine; it is apparently advantageous to add alcohol to poor spirits, and difficulties due to separation of liquids were not experienced; results obtained on buses in regular service with gasoline-alcohol mixture confirmed those obtained on test bench.

Lead Tetraethyl Estimation. The Estimation of Lead Tetraethyl in Motor Spirit, S. F. Birch. Instn. Petroleum Technologists—Jl., vol. 10, p. 46, Nov. 1924, pp. 816-817. Describes method which gives sufficiently accurate and trustworthy results for most purposes.

Lignite as Source of. Lignites and the Manufacture of Automobile Fuel (Les lignites et la fabrication des carburants), E. Marcotte. Revue Industrielle, vol. 54, no. 2178, May 1924, pp. 85-94, 5 figs. Notes on extraction of light products; classification of possible treatments; recovery of benzol— objections against distillation of lignite; hydrogenation; Bergius process and its industrial application; liquefaction direct from

coal; Mélamid process; Fischer and Schrader processes.

Producer Gas. Producer Gas for Road Transport. Motor Transport (Lond.), vol. 38, no. 1002, May 12, 1924, p. 580, 1 fig. Details of gas-producer plant; question of cost; results of recent French trials with charcoal as fuel.

Production from Solid Fuels. The Bergius Process. Motor Transport (Lond.), vol. 38, no. 990, Feb. 18, 1924, pp. 183-184, 1 fig. Principle of newly developed method of oil-distillate production from solid fuels.

Resources and Supplies. Fuel Resources and Supplies for Road Transport, E. J. W. Slade. Instn. Petroleum Technologists—Jl., vol. 9, no. 40, Dec. 1923, pp. 452-468, 3 figs. Discusses world production of crude petroleum, amount of petroleum exported from each producing area, world consumption of petroleum products and motor spirit, etc., giving tables.

Tetralin. Tetralin, Fred. Nathan. Fuel, vol. 3, no. 10, Oct. 1924, pp. 346-349. Its history, manufacture, and use as fuel for internal-combustion engines; produced by process of hydrogenating naphthalene.

Theory. Theory of Fuels for Internal-Combustion Engines (Zur Theorie der Brennstoffe für die Brennkraftmaschinen), M. Brutzkus. Brennstoff- u. Wärmewirtschaft, vol. 6, nos. 6, 7, and 8, June, July, and Aug. 1924, pp. 129-138, 154-160, and 181-185, 1 fig. Discusses theory of combustion at variable pressure, calculation of variability, volume changes, heat of combustion, etc., of various liquid and gaseous fuels; most important technical fuels; theory and practice.

Volatility. Economic Motor-Fuel Volatility, R. Birdsell. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 267-273, 9 figs. Results obtained from acceleration tests made on road and in laboratory, to determine whether rates of acceleration obtainable at any given temperature are different for fuels compared, and whether, when carburetor settings are such as to give maximum acceleration with each fuel, fuel consumption under constant speed and load conditions will be greater with one fuel than with other. Appendix contains analytical description by W. S. James of design of disk used to simulate inertia of car.

AUTOMOBILE INDUSTRY

Austria. The Austrian Automobile Industry (Aus der österreichischen Kraftfahrzeugindustrie), J. Zoller. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 243-245, 9 figs. Development of industry; results of war; examples of Austrian types.

National Defense, and. The Automotive Industry and National Defense, C. L'H. Ruggles. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 319-322, 1 fig. Position of automotive industry; dependence of army on transportation; methods of preparation; War Department plans for meeting contingencies; ideal solution.

S. A. E. Standards Reports. Standards Committee Division Reports. Soc. Automotive Engrs. Jl., vol. 14, no. 6, June 1924, pp. 625-640, 15 figs. Gives following Division Reports: Parts and fittings; agricultural power equipment; ball and roller bearings; lighting; non-ferrous metals; screw threads; springs.

Standards Committee Meeting. Soc. Automotive Engrs. Jl., vol. 14, no. 2, Feb. 1924, pp. 189-194. Report of Electrical Equipment Division on magnet-wire specifications; and of Tire and Rim Division on balloon tires.

Tentative Standardization Work. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 338-341. Color code for cable proposed; wire-cloth standard revision; bolt and nut standardization; sheet steel problems; revision of tube fittings. Reports of Standards Committee of S. A. E.

Standardization in. See STANDARDIZATION, Automobile Parts.

United States. 15,281,295 Cars and Trucks Registered in United States, N. G. Shidle. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 86-89. Gain of 2,916,918 over 1922 is increase of 23.6 per cent; one car for every 7.2 persons.

AUTOMOBILE MANUFACTURING PLANTS

Car Remanufacturing. Plant Opens to "Remanufacture" Cars on Production Basis. Automotive Industries, vol. 50, no. 17, Apr. 24, 1924, pp. 914-915, 3 figs. Twyman Co. employs teardown and assembly conveyors for complete rebuilding of Nash and Buick models; new closed bodies fitted if desired.

Central Europe. Production Methods in Central Europe. Automobile Engr., vol. 14, no. 188, Apr. 1924, pp. 106-111, 21 figs. Review of present situation in automobile industry in Germany and adjacent countries; mass-production methods; machine-tool equipment; tool room; inspection and testing apparatus; storage; utilization of waste materials; training apprentices.

Chevrolet Bodies. Chevrolet Tarrytown Plant Assembles 600 Complete Cars a Day, H. Chase. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, pp. 666-671, 3 figs. Plant for building, enameling, and trimming all open bodies required; most operations are performed on continuously moving conveyors; tunnel baking ovens employed; maximum temperature held at 350 deg. fahr.

Conveyors, Use in. See CONVEYORS, Automobile Factory.

Design. Processes Affect Design of Automobile Factories, F. A. Fairbrother. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 834-836, 4 figs. Neither multi-story nor single-story building best for all cases; heating easier in former, natural lighting and ventilation in latter.

England. Intensive Production. Automobile Engr., vol. 14, no. 191, July 1924, pp. 203-210, 21 figs. Describes modern works located at Aylesbury, Bucks, planned and equipped for large outputs.

Modern Production Methods. Automobile Engr., vol. 14, no. 185, Jan. 1924, pp. 15-19, 14 figs. Methods and equipment employed in manufacture of Sunbeam cars at Wolverhampton, England.

Tooling the New 14 h.p. Bean Car. Machy. (Lond.), vol. 23, nos. 590, 591, 592, 594, 595, and 596, Jan. 17, 24, 31, Feb. 14, 21, and 28, 1924, pp. 505-508, 537-542, 569-574, 633-638, 665-670, and 697-701, 61 figs. Details of equipment used by A. Harper, Sons & Bean, Dudley, in production of engine and chassis parts.

Fiat, Italy. The Impressive Story of Fiat, J. A. Lucas and F. E. Bardrof. Serial article in Am. Mach., vols. 60 and 61, beginning Apr. 24 and ending Aug. 21, 1924. Apr. 24: Plants and products of large automobile company in Turin, Italy. May 1 and 8: Manufacture of ball bearings. May 22: Lingotto automobile plant; shop arrangement and management; apprenticeship system. June 19: Raw-material handling at Lingotto plant; forging and stamping departments; molding and machining operations in foundry. July 3: Methods employed in machining pistons for Fiat motor. July 10: Methods and tools used in making connecting rods. July 24: Methods employed in machining 4-cylinder block at Lingotto plant. Aug. 7: Machining methods for upper section of crankcase. Aug. 21: Final operations on crankcase.

Trial Runs on Top of the Fiat Factory in Lingotto (Die Einfahrbahn über der Fabrik Fiat im Lingotto). Allgemeine Automobil-Zeitung, vol. 25, no. 45, Nov. 8, 1924, pp. 19-21, 5 figs. Details of Fiat factory building on top of which a course has been built for trial runs of all automobiles built at factory up to their maximum speed.

Ford Lincoln. What Ford Has Done in the Lincoln Plant, F. H. Colvin. Am. Mach., vol. 59, nos. 25 and 26, Dec. 20 and 27, 1923, pp. 897-901 and 943-947, and vol. 60, no. 1, Jan. 3, 1924, pp. 5-8, 26 figs. Details of methods used to build better car at less cost. Dec. 27: Assembling and inspecting Lincoln motor parts; honing cylinders and polishing gear teeth. Jan. 3: How chain or continuous, assembly is combined with trucks for carrying chassis forward for various operations.

Ford Motor Company of Canada. Building a Car a Minute at Ford City, H. P. Armson. Can. Machy., vol. 31, no. 26, June 26, 1924, pp. 41-48 and 80, 9 figs. Description of 15-acre machine shop of Ford Motor Co. of Canada, and of some operations.

Ford's New $10,000,000 Factory at Ford. Can. Mfr., vol. 44, no. 6, June 1924, pp. 11-15, 5 figs. Layout of plant, construction of buildings, and description of machine shop.

Foundries. See FOUNDRIES, Automobile Castings.

Grinding Parts in. See GRINDING, Automobile Parts.

Lighting. See LIGHTING, Automobile Factory.

Location. The Factor of Plant Location in Automobile Production, J. A. Piquet. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 297-304, 10 figs. Analysis of factors which determine location of plants both established and contemplated.

Lumber Handling in. See LUMBER, Handling.

Machine-Shop Economies. Possible Economies in Automotive Machine-Shop Operations, A. L. DeLeeuw. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 418-425. See also Am. Mach., vol. 61, nos. 19 and 20, Nov. 6 and 13, 1924, pp. 735-738 and 765-770. Indicates by examples certain important economies that might be introduced in shops, especially those which can be effected without much capital outlay; discusses auxiliaries and one definite operation, drilling, has been chosen as chief example.

Machine Shops. See MACHINE SHOPS, Ford Motor Co.

Machine Tools for. Large Fixtures and Tools for Building Twin City Tractors, H. Campbell. Am. Mach., vol. 60, no. 25, June 19, 1924, pp. 907-910, 13 figs. Details of operations on large automotive units at plant of Minneapolis Steel & Machy. Co., Minneapolis.

Materials Handling in. See MATERIALS HANDLING, Automobile Manufacturing Plants.

Methods and Machinery. Workers, Machinery, and Production in the Automobile Industry, M. W. La Fever. Monthly Labor Rev., vol. 19, no. 4, Oct. 1924, pp. 1-26. Study made by Bur. of Labor Statistics of changes in methods and machinery in automobile industry; data obtained from 25 automobile manufacturing plants regarding actual production per man before and after inauguration of improved methods, systems, machinery, devices, etc.

See also MACHINING METHODS.

Oil-Fuel-Burning. Burning Oil Fuel in a Ford Motor Co. Plant, A. Murphy. Power House, vol. 17, no. 4, Feb. 20, 1924, pp. 20-21 and 38, 4 figs. Oil-burning forced-circulation hot-water-type heating system installed; high-pressure steam provides source of heat for drying ovens.

Organization. See INDUSTRIAL ORGANIZATION, Automobile Manufacturing Plant.

Service-Parts Department. Durant Service is Aided by Prompt Shipment of Parts. Automotive Industries, vol. 50, no. 14, Apr. 3, 1924, pp. 768-771, 5 figs. Over 95 per cent of orders are filled on day of receipt, hence dealers need carry less stock; requisitions on factory placed four months in advance tend to prevent shortages.

Steam Trucks. The Sentinel Steam Wagon Works. Engineer, vol. 137, no. 3559, Mar. 14, 1924, pp. 280-282, 16 figs, partly on p. 284. Describes works erected near Shrewsbury; shops consist of fitting and erecting shops, where engines are erected; smiths' shop, in which all smaller forgings are produced; body shop; sheet metal-working and frame shop; machine shop; running shop; and physical and chemical laboratories.

AUTOMOBILES

A. C. Racing. Maximum Power for Minimum Weight. Autocar, vol. 53, no. 1499, July 11, 1924, pp. 63-64, 3 figs. New A. C. racing car with "crab" track, which has been specially built for rapid acceleration.

Acceleration Measurement. See ACCELEROMETERS, Automobile Acceleration, Measurement.

Accessories. The Olympia Motor Show, 1924—Accessories to Be Seen. Auto-Motor Jl., vol. 29, no. 41, Oct. 9, 1924, pp. 845-858, 67 figs. See also Autocar, vol. 53, nos. 1511 and 1514, Oct. 3 and 24, 1924, pp. 605-616 and 898-901, 97 figs. Brief descriptions of exhibits of different firms.

Adler. See German.

Air Resistance. The Automobile in Air Current (Das Auto im Luftstrom), E. Rumpler. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 3-4, Feb. 26, 1924, pp. 22-25, 9 figs. Discusses progress made in recent years in application of airplane theories to automobile design; introduction of streamline automobile developed by author in 1921; results of experiments carried out at Aerodynamic Experimental Station in Göttingen. See also article entitled Air Resistance and High-Speed Automobiles (Luftwiderstand und Schnellkraftwagen), A. Persu, pp. 25-27, 3 figs., discussing future design of streamline automobiles.

Albatros. The 8 H.P. Albatros Car. Auto-Motor Jl., vol. 29, no. 19, May 8, 1924, pp. 393-395, 10 figs. British-built car. Four-cylindered monobloc engine built up as one unit with clutch case and gear box and an entirely enclosed propeller shaft in a tubular torque member transmits power to newly designed rear axle.

Alfa Romeo. The Alfa Romeo Cars. Auto-Motor Jl., vol. 29, no. 47, Nov. 20, 1924, pp. 1020-1022, 10 figs. Particulars of four-cylinder and six-cylinder models of Italian vehicle; former is known as the 15-50 hp., and other the 21-70 hp.; overhead valves and four-wheel brakes.

All-Weather Enclosures. Inexpensive All-Weather Enclosures Aim of British Car Makers, M. W. Bourdon. Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 22-24, 5 figs. 80 per cent of users dislike riding under cover; framed side curtains are much used; many of these are employed as wind screens when top is folded.

Alvis. The Alvis Car. Auto-Motor Jl., vol. 29, no. 37, Sept. 11, 1924, pp. 765-768, 12 figs. Monobloc engine is mounted in chassis on subframe of pressed steel, camshaft is carried in three large-diameter bearings and driven by timing gear wheels of hard phosphor bronze; overhead-valve engine; plungers are spring-pressed and lower ends of push-rods descend into them.

Amsterdam Show. The Automobile Show in Amsterdam, Holland, February, 1924 (''De Teotoonstelling van Automobilen'' in Amsterdam), W. Hirschfeld. Motorwagen, vol. 27, nos. 10, 11, and 12, Apr. 10, 20, and 30, 1924, pp. 161-166, 179-183, and 206-209, 37 figs. Details of most important exhibits of automobiles, motor trucks, and auxiliary parts.

Ansaldo. The Ansaldo Chassis. Automobile Engr., vol. 14, no. 197, Dec. 1924, pp. 384-392, 16 figs. Details of two models of typical Italian design.

The 14 H.P. Ansaldo Car. Auto-Motor Jl., vol. 29, no. 3, Jan. 17, 1924, pp. 49-52, 9 figs. Four-cylinder engine of capacity of 1987 c.c., having cylinder bore of 72.5 mm. and stroke of 120 mm.; develops 47 h.p. at 2900 r.p.m.

Armstrong-Siddeley. The 14 H.P. Armstrong-Siddeley. Auto-Motor Jl., vol. 29, no. 21, May 22, 1924, pp. 435-437, 11 figs. A roomy family touring car; four cylinders; speed, efficiency, and economy.

Assembly. See MATERIALS HANDLING, Automobile Manufacturers' Plants.

Austin. New Austin Seven Horsepower Model Has Frameless Body, M. W. Bourdon. Automotive Industries, vol. 51, no. 16, Oct. 16, 1924. pp. 674-677, 5 figs. British light car intended as substitute for motorcycle and side car, also has unusual chassis construction; capable of carrying four passengers.

Axle Bearings. See BEARINGS, Automobile Axles.

Axle Housings. Machining Motor Bus Axle Housings, H. Campbell. Am. Mach., vol. 60, no. 19, May 8, 1924, pp. 699-700, 7 figs. Machining largest rear-axle housing forging yet developed; using gun-drilling machine in automotive plant; multiple drilling operation in engine lathe.

Axles. A British Method of Building Axles, A. J. Aiers. Am. Mach., vol. 60, no. 12, Mar. 20, 1924, pp. 421-423, 10 figs. Fixtures employed in machining malleable-iron axle housing for 11-hp. car; double-duty fixtures minimize chances for making errors.

American Rear and Front Axle Specifications. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, pp. 422-423. Specifications of different makes for passenger cars, buses, and trucks.

Manufacturing the Ruckstell Two-Speed Axle, H. P. Armson. Can. Machy., vol. 31, no. 14, Apr. 3, 1924, pp. 31-35, 5 figs. Producing and heat treating housings, ring gears, bronze supports, sliding and plate gear clutches, for passenger car and truck axles, at plant of Russel Gear and Machine Co., Toronto, Can.

New Columbia Axles Designed for Use with Four-Wheel Brakes. Automotive Industries, vol. 50, no. 9, Feb. 28, 1924, pp. 508-509, 2 figs. Steering knuckle is reversed Elliott type and is formed with circular flange to which brake cover plate is secured by six rivets; feature of rear axle is one-piece gear carrier.

Outstanding Tendencies in Axle Design, W. F. Rockwell. Soc. Automotive Engrs.—Jl., vol. 15, no. 3, Sept. 1924, pp. 189-194, 7 figs. Discusses semi-floating type of axle, worm-drive passenger-car axles, motor-truck rear-axle types, unsprung weight, and future car and truck axles.

See also AXLES, Automobile.

Baer. See German.

Ball Bearings. See BEARINGS, BALL, Automobile.

Bean. The 14 H.P. Bean Chassis. Automobile Engr., vol. 14, no. 191, July 1924, pp. 188-195, 16 figs. on supp. plate. 14-hp. chassis manufactured by A. Harper, Sons & Bean, Ltd., of Dudley and Tipton has four-cylinder engine built in one unit with four-speed gear box; 75 mm. bore by 135 mm. stroke.

The New 20-25 cwt. Bean Chassis. Motor Transport (Lond.), vol. 39, no. 1029, Nov. 17, 1924, pp. 591-593, 8 figs. Overall length, 14 ft. 1½ in.; overall width, 5 ft. 5½ in.; wheelbase, 10 ft. 6 in.; track, 4 ft. 8 in.; 4-cylinder engine, 13.9 R.A.C. rating.

Beardmore. The 12.30 H.P. Beardmore Car. Auto-Motor Jl., vol. 29, no. 18, May 1, 1924, pp. 367-370, 14 figs. Four-cylinder monobloc overhead valve engine, with clutch and gear integral, and propeller shaft drive to spiral bevel-driven silent live axle, with Hotchkiss type of torque taking semi-elliptic underslung springs.

Bentley. The Three-Litre Bentley. Auto-Motor Jl., vol. 29, no. 7, Feb. 14, 1924, pp. 137-140, 13 figs. Mechanical details, and equipment. Two inlet and two exhaust valves arranged in each cylinder; 4-cylinder engine of monobloc construction; cylinder bore 80 mm. and piston stroke 149 mm., carrying an R.A.C. rating of 15.9 hp., and capable of propelling standard model vehicle at 75 m.p.h.

Benz. New 6-Cylinder 40-hp. Car Brought Out by Benz, B. R. Dierfeld. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 332-336, 7 figs. Engine is L-head type; cylinders 13/16-in. bore and 4⅝-in stroke; radiator is V-type; oil tightness of rear bearing on gear housing is secured in novel manner; maximum speed, 53 m.p.h.

Berliet. A New Passenger Chassis. Motor Transport (Lond.), vol. 39, no. 1017, Aug. 25, 1924, pp. 235-236, 6 figs. Discusses engine details, bearings and lubrication, transmission, etc. Gives outcome of experiences with coaches in mountainous districts.

See also Charcoal-Producer-Gas-Burning.

Berlin Show. Automobiles Exhibited at the Berlin Show. Motorwagen, vol. 27, no. 34, Dec. 10, 1924, pp. 689-698, 12 figs. Describes Brennabor 6-hp. and 8-hp., and Simson Supra automobiles, and Mannesmann-Mulag 5-ton truck.

Passenger Cars at the Berlin Automobile Show (Die Personenwagen auf der Berliner Automobilausstellung), R. C. v. Gorrissen. Allgemeine Automobil-Zeitung, vol. 25, nos. 50, 50a, 51, and 52, Dec. 12, 15, 17, and 27, 1924, pp. 47-50, 34-38, 45-49, 19-23, and vol. 26, no. 1, Jan. 3, 1925, pp. 20-23, 25 figs. Review of exhibits, tendencies of design, and special features.

Bignan Sport. Unusual Body Design of Bignan Sport Car Permits Increased Speed. Automotive Industries, vol. 50, no. 17, Apr. 24, 1924, pp. 910-911, 7 figs. New type characterized by special streamlining; constructed to provide additional comfort and economy; seats mounted on chassis frame; body designed by P. Forostovsky, Jr.

Bodies. Carriages at the Salon. Autocar, vol. 53, no. 1512, Oct. 10, 1924, pp. 699-702, 15 figs. New features in bodywork at Paris show. Covered cars in favor; fabric-covered saloons a feature.

Coachwork at the Show. Autocar, vol. 53, no. 1514, Oct. 24, 1924, pp. 883-897, 75 figs. Description of exhibits at 1924 Olympia show, England, arranged in alphabetical order.

Low Priced Closed Cars, Increase in Number, H. Chase. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 72-77, 27 figs. Better-looking radiators have improved frontal appearance and hood lines; sport models still popular.

1924 in Automobile Body Engineering, K. Forbes. Automotive Mfr., vol. 66, no. 7, Oct. 1924, p. 15. Difficulty of body standardization and reasons therefor; body development compared to that of chassis and mechanical parts; closed cars. (Abstract.)

Why Not Build All-Purpose Bodies with Rear Doors?, H. W. Perry. Automotive Industries, vol. 50, no. 3, Jan. 17, 1924, pp. 126-127. Suggests design for style of body that is obviously first a private passenger car body, but that is adapted for secondary purpose of carrying light loads of miscellaneous articles; side entrance for passengers would be retained and back seat cushions arranged to be folded quickly against rear of front seat.

Bodies, Design. Symmetry in Car Contours. Autocar, vol. 52, no. 1484, Mar. 28, 1924, pp. 555-562, 19 figs. Views on balance of outline necessary to secure gracefulness and beauty in outward appearance combined with individuality of design.

Bodies, Fabric. Rover Develops Modified Type of Weymann Fabric Body, M. W. Bourdon. Automotive Industries, vol. 51, no. 2, July 10, 1924, pp. 104-107, 12 figs. New design incorporates some metal panels where rounded corners are desired, but entire structure is covered with leather fabric. Lining materials are waterproofed. Door pillars have inward curve. Air gap or cloth strip used at all joints to prevent squeaks.

Bodies, Finishing. Automobile Body Finishing With Abrasives. Abrasive Industry, vol. 5, no. 7, July 1924, pp. 171-173, 6 figs. Notes on methods followed by Chandler Motor Car Co., Cleveland.

China Wood Oil Is Used as Base for Baked Color Enamel, W. L. Carver. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 324-326. New process developed at Olds Motor Works to produce several shades; only slight variation necessary from regular routine of black enameling department. Tung tree nuts, found only in inaccessible parts of China, is base of enamel.

Egyptian Lacquer Develops New Nitrocellulose Automobile Finish, H. Chase. Automotive Industries, vol. 50, no. 15, Apr. 10, 1924, pp. 828-829. Differs from other products in same general class by employing priming, filler and glaze coats which have same pyroxylin base and quick air-drying qualities as final colors; exceptional durability and rapid completion of work among chief claims made.

High Brake Pre-Enameled Panels Used in Body Construction. Automotive Mfr., vol. 66, no. 1, Apr. 1924, pp. 9-11, 4 figs. Details of new type of construction which permits easy application of hard permanent finish to metal panels applied over conventional wood frame.

More Durable Car Finishes Are Making Their Appearance. Automotive Industries, vol. 50, no. 14, Apr. 3, 1924, pp. 777-779, 5 figs. Cellulose nitrate coating is said to last as long as vehicle and retains permanent luster; better undercoats double life of ordinary varnish jobs; black and color enamels, when dulled, are easily restored by rubbing and polishing.

New Valentine Varnish System Said to Double Life of Finish. Automotive Industries, vol. 50, no. 18, May 1, 1924, pp. 968-969, 1 fig. Only six coats required on best grade of work with new system; durability attributed to high and balanced elasticity and use of two clear final coats giving film of unusual thickness; used on Cadillac, Lincoln, and Packard.

Ultra-Violet Rays Used to Test Body Fabrics and Finishes, W. L. Carver. Automotive Industries, vol. 50, no. 19, May 8, 1924, pp. 1011-1014, 5 figs. Few hours of exposure under suitable conditions may be equal to many months of natural weathering; utilization of quartz-tube mercury vapor lamp which emits ultra-violet rays, which may also be employed to dry varnish.

What Basic Materials Go Into Automobile Finishes? Automotive Industries, vol. 51, no. 1, July 3, 1924, pp. 34-38. Information regarding nature of materials used in finishing of automobile bodies and chassis.

Wood Framed Bodies Finished in High Bake Enamel by New Process, W. L. Carver. Automotive Industries, vol. 50, no. 13, Mar. 27, 1924, pp. 718-720. Special coating, placed on frame prior to enameling, protects wood members from intense heat; commercial use of China wood oil makes possible this method, known as Oxvar system.

Bodies, Manufacture. Automobile Body Engineering, W. F. Brown. Automotive Mfr., vol. 66, nos. 3 and 4, June and July 1924, pp. 12-14 and 13-15. Describes strength, lines and general outline, vertical stresses, frame and window framing, quarters and roof, longitudinal stresses, body iron work, panel work, aluminum moldings and general use of light-weight metals, body framework, reducing weight and standards of weight.

Manufacturing All-Steel Automobile Bodies, J. W. Meadowcroft. Am. Welding Soc.—Jl., vol. 3, no. 5, May 1924, pp. 24-26. Particulars of welding operations.

Packard Bodies Assembled in Metal Jigs to Minimize Hand Fitting. Automotive Industries, vol. 50, no. 24, June 12, 1924, pp. 1272-1273, 4 figs. Production methods similar to those used in chassis manufacture are employed in putting together wood frames and units from which they are constructed.

See also Wood for Bodies.

Bodies, Repairs. Fisher System Places Body Repairs on Par with Chassis Service, W. L. Carver. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 572-574, 1 fig. Units and bodies so numbered that replacements can be made on short notice; car distributors are supplied with parts books from which stocks are ordered.

Bodies, Steel, Welding. See OXY-ACETYLENE WELDING, Automobile Bodies.

Brakes. Action of New Air Brake Dependent on Motion of Vehicle. Automotive Industries, vol. 51, no. 3, July 17, 1924, pp. 165-169, 8 figs. See also Motor Transport (Lond.), vol. 39, no. 1028, Nov. 10, 1924, pp. 559-561, 6 figs. Describes new air brake brought out by Knorr Bremse A. G. of Berlin-Lichtenberg. Road wheels cannot lock; horn is sounded automatically with brakes in emergency position; designer has worked out types for various classes of motor vehicles and also for trailers.

Automobile Brakes (Le freinage des automobiles). Vie Technique & Industrielle, vol. 6, no. 52, Jan. 1924, pp. 226-234, 12 figs. Notes on problem and difficulties of braking; principles of servo brakes, and advantages of Hallot system of servo brakes; effect of Hallot automatic regulator on automobile brakes; Perrot, Birkigt and Isotta-Fraschini brake systems; control of brakes in Renault automobile.

Difficult Problems Involved in Power Braking for Motor Vehicles, P. M. Heldt. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, pp. 656-666, 8 figs. Describes Westinghouse air-brake equipment for rail cars and Simplex vacuum brake for passenger cars and trucks; problems involved in design of efficient power-braking systems.

Hydraulic Brake Operation. Autocar, vol. 52, no. 1482, Mar. 14, 1924, pp. 465-467, 6 figs. Consideration of a system, remarkable for its simplicity and efficacy, which was first tried over twelve years ago.

Lockheed Develops Internal Brake of the Three-Shoe Type. Automotive Industries, vol. 51, no. 23, Dec. 4, 1924, p. 975, 1 fig. Actuated in same manner as in external hydraulic equipment, new device utilizes wrapping action between brake and drum to reduce required pedal pressure.

Notes on Automobile Brakes, D. Roesch. Armour Engr., vol. 15, nos. 3 and 4, Mar. and Apr. 1924, pp. 91-94 and 112, and 135-139 and 151, 15 figs. Brake requirements, and performance obtainable with different systems; discusses representative types and gives data pertaining to brake design; highway capacity and influence of various conditions upon stopping distances, with legislative requirements in mind.

Recent Patents Reveal Tendencies in Brake Design. Automotive Industries, vol. 51, no. 12, Sept. 18, 1924, pp. 520-522, 8 figs. Outlines some recently issued foreign brake patents. Among features covered are equalization without loss of all brakes should linkage break, simultaneous operation of transmission and rear-wheel brakes, and servo mechanism.

Servo-Mechanisms Perfected So That Slightest Pedal Pressure Slows Car, P. M. Heldt. Automotive Industries, vol. 51, no. 25, Dec. 18, 1924, pp. 1035-1039, 9 figs. Describes various types of servo brakes.

Special Apparatus Tests Rickenbacker Brakes on Assembly Line. Automotive Industries, vol. 50, no. 11, Mar. 13, 1924, pp. 621-623, 2 figs. Rods are adjusted to permanent length which is not altered during road test; equipment involves set of power-operated drums which contact with wheels and elevating mechanism.

Study of Gripper Brakes for Automobiles and Lifting Devices (L'étude des freins à machoires pour automobiles et appareils de levage). Génie Civil, vol. 84, no. 19, May 10, 1924, pp. 452-454, 4 figs. General considerations on functioning of brakes; elementary calculation; distribution of pressure; determination of bending.

The Hallot Servo Brakes for Automobiles (Le servo-frein Hallot, pour automobiles). Génie Civil, vol. 84, no. 8, Mar. 1, 1924, pp. 212-213, 2 figs. Discusses action of servo brakes and describes Hallot brake which is one of most widely used of this type.

The Rolls-Royce Six-Brake System. Autocar, vol. 53 no. 1511, Oct. 3, 1924, p. 590, 1 fig. Some details of operation. Oil servo mechanism employed.

The Theory and Advantages of Balanced Brake-Forces, Geo. L. Smith. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 111-116, 4 figs. Describes two methods of brake application in use in United States, and expounds theory of balanced brake forces; practical applications of equalizing mechanism used in road tests of automobile; tests on wet pavements with study of skidding and skid-checking effects; results of tests on hills and effects of speed and pressure.

Two Types of Brakes for Front Axles Produced by Salisbury. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 344-345, 3 figs. Expanding device intended for cars weighing up to 2400 lb. and contracting for somewhat heavier models; unusual feature is use of Elliott-type steering knuckles.

See also Brakes, Four-Wheel.

Brakes, Four-Wheel. Advantages and Disadvantages of 4-Wheel Brakes (Licht- und Schattenseiten der Vierradbremsen), v. Löw. Automobil-Rundschau, vol. 23, no. 5, May 1924, pp. 51-53, 11 figs. Critical discussion of advantages and disadvantages.

Four-Wheel Brakes, H. Perrot. Soc. Automotive Engrs.—Jl., vol. 14, nos. 2 and 4, Feb. and April 1, 1924, pp. 101-106, 4 figs., and (discussion) 432-436. Discusses servo-brake with special reference to Perrot system, advantages of which are set forth specifically; discusses brake-system design in general and comments on brake lining, front springs and various precautionary measures that must be incorporated; explains non-use of equalizers and cites seven specific important items that should govern all four-wheel-brake design; future development of automobile chassis, as affected by present trend of brake-system practice.

Four-Wheel Brakes and Low Pressure Tires Prove Worth in Grand Prix, W. F. Bradley. Automotive Industries, vol. 51, no. 8, Aug. 21, 1924, pp. 364-365, 1 fig. Discusses 14-mile course requiring twenty gear changes per lap; superchargers give considerably more power.

Four-Wheel Brakes Are Most Striking Mechanical Feature of (New York) Show, P. M. Heldt. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 64-70, 25 figs. Standard equipment on 44 models and optional on 37 hydraulically operated systems strongly represented; new braking methods affect front axles; clutch improvements.

Four-wheel Braking for Cabs, W. F. Bradley. Motor Transport (Lond.), vol. 38, no. 984, Jan. 7, 1924, pp. 17-18, 5 figs. Experiences in Paris taxicab work; describes newest Parisian taxicab design, the Serex braking system, giving some details of experiences of which it is the outcome.

Four-Wheel Braking Systems, F. A. Stepney Acres. Automobile Engr., vol. 14, no. 188, Apr. 1924, pp. 115-118, 4 figs. Arrangement of brakes; brake-power ratio; mechanical difficulties; pedal leverage; central steering; compensation; front springs; brake-rod layout.

Hydraulic Brakes on Test, H. F. Blanchard. Autocar, vol. 52, no. 1495, June 13, 1924, pp. 1070-1072, 5 figs. Further details of Lockheed four-wheel system with data gleaned from actual trials.

New Hydraulic Brake System. Automotive Industries, vol. 50, no. 11, Mar. 13, 1924, p. 615, 1 fig. New 4-wheel hydraulic-brake system worked out by Mattingly Automatic Valve Co. of St. Louis, claimed to possess advantage that if connection to any of four brake cylinders should break or otherwise become seriously defective, remaining three brakes will not be prevented from functioning.

See also MACHINING METHODS, Automobile Brake Parts.

Braking. Difficult Problems Involved in Power Braking for Motor Vehicles, P. M. Heldt. Automotive Industries, vol. 50, no. 11, Mar. 13, 1924, pp. 616-620, 11 figs. First application of air brakes, most extensively used type, was in 1906; electric unit on car in 1914; recent development work, eliminating many troubles.

British Empire Exposition. At the British Empire Exhibition. Motor Transport (Lond.), vol. 38, no. 1002, May 12, 1924, pp. 581-585, 9 figs. Reviews features of transport vehicle exhibits and gives details of tires, accessories, and component parts.

Cars at the British Empire Exhibition. Autocar, vol. 52, no. 1489, May 2, 1924, pp. 785-792, 46 figs. Summarized specifications of models on view; 80 cars, ranging from 749-cc. to 7413-cc. cylinder capacity, represent 47 different manufacturers.

The British Empire Exhibition. Automobile Engr., vol. 14, no. 190, June 1924, pp. 175-181, 14 figs. Notes on automobile manufacturers' exhibits.

Bugatti. The Four-Cylindered Bugatti. Auto-Motor Jl., vol. 29, no. 28, July 10, 1924, pp. 581-583, 11 figs. 11.5-hp. monobloc, four-cylinder engine, 1452 and 1496 c.c.; road speed, 60 m.p.h.; touring, 20 to 25 m.p.h.; 1 gal. gasoline required for 40 miles.

See also Grand Prix.

Buick. Buick Adds a New Six to Its Line with Slight Changes in Design. Automotive Industries, vol. 51, no. 2, July 10, 1924, pp. 92-96,

9 figs. Particulars of Standard Six, having 3x4½-in. cylinders, giving it a displacement of 191 cu. in., and 114¾-in. wheelbase. New Fisher self-ventilating windshield used on Buick closed cars.

The New 20 H.P. Buick. Auto-Motor Jl., vol. 29, no. 34, Aug. 21, 1924, p. 708, 2 figs. Design and construction of two models of six-cylindered engines.

Bumpers. Low Weight and Great Shock Absorption Chief Aims of Bumper Design, P. M. Heldt. Automotive Industries, vol. 51, nos. 15 and 16, Oct. 9 and 16, 1924, pp. 642-645 and 690-694, 11 figs. Object of design is to secure greatest capacity for absorbing energy within defined limits of weight and deflection; modern methods give severe test under shock and static load. Static tests and methods of calculating results; height from ground and standards given for mounting.

Motor-Car Bumpers, J. R. Reyburn. Soc. Automotive Engrs.—Jl., vol. 15, No. 4, Oct. 1924, pp. 359-362, 9 figs. Characteristics of early bumpers; designing most protective bumper; importance of easy application, etc.

Burford-Kegresse. The Burford-Kegresse Chassis. Motor Transport (Lond.), vol. 39, no. 1018, Sept. 1, 1924, pp. 257-259, 7 figs. Constructional details and particulars of performance in strenuous drawbar tests; engine with all four cylinders in single casting has bore and stroke of 100 and 140 mm., respectively.

Calcott. A Completely New Calcott. Autocar, vol. 53, no. 1507, Sept. 5, 1924, pp. 421-424, 10 figs. Specifications: 12.8 hp., four-cylinder, 72-by 120-mm. detachable-head engine; single dry-plate clutch, separate four-speed gear-box transmission; detachable steel wheels with low-pressure tires.

The 12-24 H.P. Calcott, Auto-Motor Jl., vol. 29, no. 51, Dec. 18, 1924, pp. 1109-1112, 12 figs. Engine and clutch form one unit, while 4-speed gear box is mounted as separate unit upon cross members of frame; engine is of monobloc 4-cylinder type with detachable head.

Calthorpe. The 12-20 H.P. Calthorpe Chassis. Automobile Engr., vol. 14, no. 185, Jan. 1924, pp. 2-9, 15 figs. See also Auto-Motor Jl., vol. 29, no. 5, Jan. 31, 1924, pp. 97-100, 11 figs. Four-cylinder engine with cylinders cast in block is bolted to four-speed gear box, power being transmitted through exposed propeller shaft to spiral bevel-driven rear axle; will develop 30 hp. at 3200 r.p.m.

Cars for Shipping. See CARS, FREIGHT, Standard, Pennsylvania R. R.

Castings. See CASTINGS, Automobile.

Change Gears. Change Gear for Automobiles (Wechselgetriebe für Kraftwagen), v. Soden. Maschinenbau, vol. 3, no. 8, Jan. 24, 1924, pp. 200-203, 7 figs. Deals with number and stepping of gears.

Charcoal-Producer-Gas-Burning. A Compact Producer Gas Plant. Motor Transport (Lond.), vol. 38. no. 996, Mar. 31, 1924, p. 385, 2 figs. Brief particulars of Berliet-Imbert apparatus with which satisfactory demonstrations have been given before French military and civic authorities; in this case plant was fitted to a 15.9-hp. Berliet touring car; does not use steam in production of gas.

Charcoal-Burning Automobiles (L'Automobile à charbon de bois), A. Troller. Nature (Paris), no. 2601, Feb. 9, 1924, pp. 94-96, 4 figs. See also Technique, Moderne, vol. 16, no. 4, Feb. 15, 1924, pp. 116-118, 8 figs. Describes Berliet system of using charcoal producer gas for automobiles and motor trucks; shows Berliet car equipped with gas producer which is placed in rear and does not alter general appearance of car.

Chassis Construction. Lighter Chassis Is Not Likely Until Body Weight Is Decreased, W. L. Carver. Automotive Industries, vol. 51, no. 1, July 3, 1924, pp. 30-33, 4 figs. Advent of leather in place of steel panels among promising possibilities. Balloon tires, smaller wheels, and tubular axles help decrease mass of unsprung parts. Present stiff and heavy frames considerd necessary to prevent wearing and rattles.

Chassis Design. American Passenger Chassis. Motor Transport (Lond.), vol. 39, no. 1030, Nov. 24, 1924, pp. 617-619, 6 figs. Review of their outstanding features of design and divergencies from British practice.

Chassis Dimensions. Table of Chassis Dimensions for Body Building. Motor Transport (Phila.), vol. 30, no. 8, July 10, 1924, pp. 303-310. Table giving dimensions of different models of various makes.

Chassis, Experimental. A Novel Experimental Chassis. Automobile Engr., vol. 14, no. 186, Feb. 1924, p. 45, 2 figs. Complicated design embodying 4-wheel driving, steering, and braking.

Chassis Lubrication. Chassis Lubrication. Soc. Automotive Engrs.—Jl., vol. 14, no. 6, June 1924. Contains following papers: Notes on Chassis Lubrication and Maintenance, A. F. Masury, pp. 641-646, 14 figs; Magazine Oiling System of Chassis Lubrication, C. T. Myers, pp. 646-648, 5 figs.

Chassis Lubrication, F. H. Gleason. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 422-430 and 445, 12 figs. Classification of means generally employed for chassis lubrication; referring to respective characteristics of grease and of oil, those of oil are summarized and preferred; describes centralized oil-lubrication system, composed of central oil reservoir and pump, main-supply line and delivery tubes; advantages of system.

Chassis Lubrication Is Simplified by Bowen System. Automotive Industries, vol. 50, no. 16, Apr. 17, 1924, pp. 876-878, 9 figs. Designed to deliver accurately measured quantities of oil to each bearing slowly for several hours after pump plunger is depresesd; air domes over each header valve serve important purpose in metering and controlling flow; special tubing used.

Tecalemit. Auto-Motor Jl., vol. 29, no. 9, Feb. 28, 1924, p. 187, 1 fig. Description of a new high-pressure lubrication system for motor-vehicle chassis, introduced by Tecalemit, Ltd., Lon.,Eng., consisting of a grease gun of special type and a special grease plug for parts to be lubricated; can be installed in all cases where usual type of screw-down grease lubricators have been used.

Chicago Show. Chicago Salon Shows Present Trends in Body Design, J. E. Schipper. Automotive Industries, vol. 50, no. 6, Feb. 7, 1924, pp. 272-275, 13 figs. Pullman exhibits all-steel model built in accordance with railway practice; Berline type seems likely to replace limousine.

Chrysler. The Chrysler Six. Auto-Motor Jl., vol. 29, no. 33, Aug. 14, 1924, pp. 685-687, 9 figs. Describes automobile having six-cylindered 68-hp. engine designed monobloc construction with bore of 3 in. and stroke of 4¼ in.

Cleveland. New Cleve'and Model Has Centralized Chassis Lubricating System. Automotive Industries, vol. 50, no. 25, June 19, 1924, pp. 1314-1318, 5 figs. Nearly all mechanical units are redesigned and wheelbase is lengthened; 31x5.25-in. balloon tires are standard equipment.

Cluley. Cluley Cars. Auto-Motor Jl., vol. 29, no. 49, Dec. 4, 1924, pp. 1065-1068, 13 figs. Two examples of 1925 models, the 10-20-hp. 4-seater and 14-30-hp. model.

Clutches. See CLUTCHES, Automobile.

Clyno. The 11 H. P. Clyno Light Car. Auto-Motor Jl., vol. 29, no. 17, Apr. 24, 1924, pp. 347-350, 10 figs. Comfortable body-work, ease of operation and economy in running; 66-mm. bore and 100-mm. stroke; capable of an output of 16 hp. on brake at 1500 r.p.m. and 25 hp. at 2950 r.p.m.

The 11 H.P. Clyno Light Car. Auto-Motor Jl., vol. 29, no. 39, Sept. 25. 1924, pp. 810-812, 10 figs. Particulars of an improved model. Four cylinders arranged monobloc, 66-mm. bore and 100-mm. piston travel.

Construction, Cast Iron in. Cast-Iron in Motor Car Construction, F. H. Hurren. Foundry Trade Jl., vol. 29, no. 405, May 22, 1924, pp. 423-426. Considers technical and metallurgical aspects of production of automobile parts, and extent to which science can assist.

Crossley. The 14 H.P. Crossley Car. Auto-Motor Jl., vol. 29, no. 26, June 26, 1924, pp. 539-541, 9 figs. Has wheelbase of 9 ft. 4½ in.; 4 cylinders; engine is supported in chassis frame by 2 arms; cylinder heads are detachable in one water-jacketed casting; carburetor is vertical type Solex.

Crouch. The 12-30 H.P. Crouch. Auto-Motor Jl., vol. 29, no. 36, Sept. 4, 1924, pp. 745-747, 10 figs. Features of design of small car; engine is 20-30 hp. British Anzani, having four cylinders of 69 mm. bore and piston stroke of 100 mm.; cylinders are cast en bloc and have detachable head.

Cushions, Pneumatic. Riding on Air. Auto-Motor Jl., vol. 29, no. 9, Feb. 28, 1924, p. 189, 3 figs. Describes novel system of upholstery put forward by Self-Controlled Air Cushion Co., Ltd., Manchester, Eng., in which a rubber bag filled with air takes place of springs.

Daimler. His Majesty's New Cars. Autocar, vol. 53, no. 1500, July 18, 1924, pp. 105-107, 9 figs. Details of 57-hp. 6-cylinder special Daimler model, of which four have been built to order of King George.

Darracq. The 12-23 H.P. Darracq. Auto-Motor Jl., vol. 29, no. 6, Feb. 7, 1924, pp, 117-120, 12 figs. Monobloc 4-cylindered engine; four-wheel brakes of simple design. Complete description.

Delage. See Grand Prix.

Delaunay-Belleville. The 15.9 H.P. Delaunay-Belleville. Auto-Motor Jl., vol. 29, no. 9, Feb. 28, 1924, pp. 181-184, 10 figs. Description of French touring car, having 4-cylinder monobloc engine with 80 mm. bore and a crank throw of 130 mm.; wheelbase, 10 ft. 6 in.; total length, 14 ft.; track, 4 ft. 8 in.

Design. Direction of Developments. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 685-686. Modern tendencies of automobile designs for 1925 and after. Comments on new features of Olympia Show cars.

Improvements in Automobile Construction (Fortschritte im Kraftwagenbau), A. Heller. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 50, Dec. 13, 1924, pp. 1281-1288, 25 figs. Notes on general arrangement; fuel problem; and ignition.

Racing's Effect on Design, W. F. Bradley. Autocar, vol. 52, no. 1491, May 16, 1924, pp. 865-866, 4 figs. Florio races (Sicily) indicate that famous continental constructors will offer production models with superchargers and dry sump lubrication as results of racing experience.

Diatto. The Two-Litre Diatto. Automobile Engr., vol. 14, no. 190, June 1924, pp. 158-164, 13 figs. Details of medium-power Italian chassis, with 4-cylinder overhead valve engine, assembled in one unit with gear box, and enclosed propeller shaft transmitting power to spiral bevel axle.

Differentials. New Type Differential Prevents Traction Loss on Slippery Ground. Automotive Industries, vol. 50, no. 6, Feb. 7, 1923, p. 289, 2 figs. Permits driving wheels to rotate at unequal speeds whenever required; marketed under name of Bement drive.

Dixie. See German.

Dodge. The Dodge Brothers Touring Car. Auto-Motor Jl., vol. 29, no. 27, July 3, 1924, pp. 559-561, 11 figs. Long chassis, roomy body, and excellent equipment features of latest Dodge car. Four cylinders have bore of 98 mm. and piston stroke is 114 mm.

Door Hinges, Manufacture. Cold Drawn Manganese Steel is Used in Latest Type Door Hinge, W. L. Carver. Automotive Industries, vol. 51, no. 16, Oct. 16, 1924, pp. 687-689, 5 figs. Simplified production methods are employed in manufacture of this body part.

Duesenberg. Duesenberg Race Car Resembles Stock Product in Many Particulars, B. M. Ikert. Automotive Industries, vol. 51, no. 3, July 17, 1924, pp. 156-160, 7 figs. Car is much smaller and lighter and has entirely different frame construction, but engine, clutch, gear set, and axles are very similar in design. Supercharger not needed in larger machine.

The Duesenberg Straight Eight. Automobile Engr., vol. 14, nos. 192 and 193, Aug. and Sept. 1924, pp. 220-223 and 252-261, 27 figs. Detailed description of racing engine and standard model adapted from it.

Electric. Electric Storage-Battery Automobiles (Les automobiles électriques à accumulateurs), A. Billaz. Vie Technique et Industrielle, vol. 5, no. 58, July 1924, pp. 232-239, 11 figs. Discusses lead and iron-nickel batteries, construction and prices, battery motors, battery trucks and their construction, operation and control.

Electric Storage Battery Automobiles (Les automobiles électriques à accumulateurs), S. Iglésis. Arts et Métiers, vol. 77, no. 48, July 1924, pp. 256-260. Discusses lead and iron-nickel storage batteries, determining distance of run without recharge, cost of current and of upkeep of batteries per km.

Present State of the Storage Battery Question for Electric Vehicles (Etat actuel de la question des accumulateurs pour véhicules électriques). Revue Industrielle, vol. 54, nos. 2181 and 2182, Aug. and Sept. 1924, pp. 236-242 and 276-282, 11 figs. Discusses lead storage batteries and their properties, construction, wear, etc. Sept.: Iron-nickel batteries, their construction and properties; comparison of two types, charging of batteries and charging apparatus.

Test of Electric Storage-Battery Vehicles (Essais de véhicules à traction électrique par accumulateurs), M. Rossignol. Arts et Métiers, vol. 77, no. 48, July 1924, pp. 260-265. Gives details of French competition and tables of data on principal French makes.

The Electric Road Vehicle, D. E. Batty. Engineering, vol. 118, nos. 3072 and 3073, Nov. 14 and 21, 1924, pp. 688-692 and 719-720, 13 figs. Its characteristics and its economic field of usefulness. (Abstract.)

See also Storage-Battery.

Electric, Small. Small Electric Motorcars. Eng. Progress, vol. 5, no. 6, June 1924, pp. 117-119, 7 figs. Describes two types of small electric automobiles manufactured in Germany, one by SB-Automobil-Ges. of Charlottenburg, and Hawa car, made by Hannoversche Waggonfabrik, Hannover-Linden.

Electric, Specifications for. American Electric Car and Truck Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 422-423. Tables of statistics.

Electric Speed Change. Electric Speed Change by Cotal System (Le changement de vitesse élec-

trique "Cotal"), E. Weiss. Nature (Paris), no. 2632, Sept. 13, 1924, pp. 174-176, 2 figs. Details of design and operation, assuring greater automaticity and rapidity of speed change.

Electrical Equipment. New Electrical Equipment Line Designed for Higher Priced Cars, P. M. Heldt. Automotive Industries, vol. 51, no. 7, Aug. 14, 1924, pp. 326-329, 4 figs. Details of electrical equipment for automobiles, manufactured by De Jon Elec. Corpn. of Poughkeepsie, N. Y. Generators and starting motors made with 4½, 5, and 5½ in. frame diameters; head at commutator end is an aluminum casting; third-brush control and magnetic output employed; closed-circuit ignition system comprises interrupter, distributor, and coil.

Problems of Motor-Vehicle Electrical Equipment Maintenance, P. J. Durham. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 162-164. Facts regarding present obstacles to proper maintenance of automotive electrical equipment; among difficulties presented are: diagnosis, headlamps, accessibility, terminal connections, fuses, wiring color code, storage battery, starting motor, and generator.

Electrical-Equipment Repairs. The Engineer's Duty in Simplifying Electrical-Equipment Repairs, J. W. Tracy. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 11-12. Selection and application of apparatus is stated to be starting point in simplifying repairs to electrical equipment; notes on maintenance of repair-parts stock; dissemination of technical information and explicit service instructions for new apparatus.

Enameling. See ENAMELING, Automobiles; Electric Ovens for.

Eric Campbell. The Eric-Campbell Cars. Auto-Motor Jl., vol. 29, no. 11, Mar. 13, 1924, pp. 225-228, 13 figs. Description of a light, fast and efficient small vehicle; good road-holding and gallon-mileage properties are features; 4-cylinder monobloc engine; bore 66 mm. and piston stroke 109.5 mm.

Essex. A Six-Cylinder Essex for 1924. Autocar, vol. 52, no. 1477, Feb. 8, 1924, pp. 248-249, 7 figs. 16.5-hp. engine.

European Grand Prix. The European Grand Prix. Autocar, vol. 53, no. 1503, Aug. 8, 1924, pp. 247-256, 19 figs. Italian success on Lyon circuit; Campari (Alfa-Romeo) averages 71 m.p.h.

Faum. See German.

Fiat. Fiat Automobile Production Methods, J. A. Lucas and F. E. Bardrof. Am. Machinist, vol. 61, no. 6, Aug. 7, 1924, pp. 223-225, 10 figs. Methods used in machining top section of crankcase; all crankcase parts are aluminum castings; various milling, drilling, and reaming operations.

See also Racing.

Fittings. On Door, Window and Ventilation Fittings. Motor Transport (Lond.), vol. 38, no. 993, Mar. 10, 1924, pp. 301-303, 7 figs. Notes on detai's that influence economy of working and make for safety and comfort of passengers.

Four-Wheel Driving, Braking and Steering. All-Wheel Driving, Braking and Steering, B. Joy. Motor Transport (Lond.), vol. 38, no. 1008, June 23, 1924, pp. 761-762, 5 figs. Considers its advantages and disadvantages.

France. The Municipal Automobile in Paris, W. F. Bradley. Motor Transport (Lond.), vol. 39, no. 1010, July 7, 1924, pp. 31-33, 5 figs. How passenger transport, refuse collecting, street cleansing, and fire fighting services are organized in French capital.

Franklin. Franklin Increases Power 33 Per Cent by Changes in Air Cooling System, P. M. Heldt. Automotive Industries, vol. 51, no. 2, July 10, 1924, pp. 101-103, 7 figs. Improvements include quickened acceleration, greater maximum speed and a more plentiful supply of oil to cylinder walls. Balloon-type tires on all models.

Frazer Nash. The New Frazer Nash. Autocar, vol. 53, no. 1500, July 18, 1924, pp. 121-122, 4 figs. Light car of 1500 c.c., four-cylinder with 3-bearing crank and overhead valves, vertical dynamo and starting motor, built by Frazer Nash, Ltd.

See also Axles.

Front Axles. The Faudi System of Standard Front Axles (Normal Vorderachsen, System Faudi). Motorwagen, vol. 27, no. 34, Dec. 10, 1924, pp. 684-689, 2 figs. Advantages of standardized front axle, developed by German engineer, are: independent springing of each of the two front axles; complete shock absorption of axle weight; reduction to minimum of forces acting upon axles, and reduction of weight of axles; elimination of tractive effort on springs; and resulting reduction of production costs and wear on rubber.

Front-End Drives. 1924 Models Show Changing Trends in Front End Drives, J. E. Schipper. Automotive Industries, vol. 50, no. 6, Feb. 7, 1924, pp. 290-291, 7 figs. Attention has been concentrated on problem of silence and balance; of manufacturers building own engines, 47 per cent use chain and 53 per cent gear type.

Fuel Consumption. Factors in Fuel Economy, Autocar, vol. 52, no. 1472, Jan. 4, 1924, pp. 17-23, 13 figs. Describes some factors that have a distinct influence on good or bad fuel consumption; results of tests carried out on Brooklands track. (Eng.)

G. W. K. The 1924 G. W. K. Car. Auto-Motor Jl., vol. 29, no. 10, Mar. 6, 1924, pp. 203-206, 12 figs. Efficient friction-drive car; 4-cylinder monobloc engine; 10.8 hp., with bore of 66 mm. and piston stroke of 100 mm.

Garages. See GARAGES.

Gas Turbines for. See GAS TURBINES, Automobiles.

Gear Boxes. New Morris Production Methods. Machy. (Lond.), vol. 24, no. 602, Apr. 10, 1924, pp. 33-38, 11 figs. Machines and methods used by Morris Engines, Ltd., Coventry, in grinding spline shafts and gears for automobile gear boxes.

Gear Sets. See GEARS, Gear Sets, Specifications.

German. A New German Two-Seater (Ein neuer deutscher Kleinauto-Zweisitzer), H. Werner. Motorwagen, vol. 27, no. 8, Mar. 20, 1924, pp. 135-136, 1 fig. 1.9/6.5-hp. BZ small car with light-metal body.

German Small Auto Industry (Die deutsche Kleinauto-Industrie). Allgemeine Automobil-Zeitung, vol. 25, no. 23, June 7, 1924, pp. 24-27, 10 figs. Details of design and construction of number of small motor-car types, including Helios, Dixie, Faum, Adler, and Baer.

Small German Automobiles (Neue "Berufs-Kleinkraftwagen"), E. Meyer. Motorwagen, vol. 27, no. 15, May 31, 1924, pp. 262-264, 2 figs. Details of new 4/14 hp. Tatra small car.

The Light Car (Der kleine Wagen), F. Pelikan. Allgemeine Automobil-Zeitung, vol. 25, nos. 37, 39 and 41, Sept. 13, 27 and Oct. 11, 1924, pp. 15-18, 23-25 and 18-20, 30 figs. Describes two French types, Citroen and Renault, a number of German light cars, and the German "autolettes."

The Simson Super-Car (Der Simson-Supra-Wagen), M. Mierwald. Allgemeine Automobil-Zeitung, vol. 25, nos. 34 and 35, Aug. 23 and 30, 1924, pp. 18-20 and 12-14, 10 figs. Supra-sport type, four-cylinder 70 by 128-mm. engine,

gears in one piece; each cylinder has four suspended valves; front and rear axle brakes.

Glasgow Show. The Scottish Motor Exhibition. Autocar, vol. 52, no. 1475, Jan. 25, 1924, pp. 167-180, 28 figs., and no. 1476, Feb. 1, 1924, pp. 207-211, 20 figs. See also Auto-Motor Jl., vol. 29, no. 4, Jan. 24, 1924, pp. 77-82, 40 figs. Data on exhibits at Glasgow show, Jan. 25-Feb. 2, 1924; representative display of British, French, Italian, American, and Canadian cars.

The Scottish Motor Exhibition. Autocar, vol. 53, no. 1518, Nov. 21, 1924, pp. 1049-1056, 30 figs. See also Auto-Motor Jl., vol. 29, no. 47, Nov. 20, 1924, pp. 1023-1027, 7 figs. Review of cars exhibited at 23rd annual show held at Glasgow, Nov. 21-29, 1924, together with analysis of latest improvements incorporated in many of the 1925 models.

Grand Prix. Three Grand Prix Cars. Autocar, vol. 53, no. 1498, July 4, 1924, pp. 19-23, 9 figs. Gives details of 12-cylinder Delage, 8-cylinder Bugatti, and 6-cylinder Sunbeam cars to compete in 2-liter race at Lyons. Delage: 12 cylinders are in 2 groups of 6, mounted on aluminum base-chamber, cylinder bore is 51.3; Bugatti: 8 cylinders of 60x88 mm. bore and stroke with 3 valves per cylinder; Sunbeam: 6-cylinder of 67x99 mm. bore and stroke.

Gwynne "Eight." The Gwynne "Eight." Auto-Motor Jl., vol. 29, no. 13, Mar. 27, 1924, pp. 265-268, 12 figs. Particulars of light car, capable of speed of from 55 to 60 m.p.h., yet at normal running it can cover 45 to 50 miles to a gallon of fuel; 4-cylindered engine.

Hampton. The Hampton Car. Auto-Motor Jl., vol. 29, no. 8, Feb. 21, 1924, pp. 159-162, 11 figs. Describes two models of English car, one of 9/21 hp. and other of 11/35 hp., both similar in general design; both have monobloc 4-cylinder overhead valve engines and clutch and speed gear integral with engine; 9/21-hp. model has 63-mm. bore and 100-mm. stroke, and 11/35-hp. model, 69-mm. bore and 120-mm. stroke.

Headlights. Desirable Road-Illumination, C. A. Michel. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 511-516, 10 figs. Laboratory approval-test specifications; specifications for desirable illumination; specially designed reflectors and lens; parabolic-reflector disadvantages; photometric-test values.

Elliptical Reflectors in Egg-Shaped Casing Feature of New Headlamp. Automotive Industries, vol. 50, no. 9, Feb. 28, 1924, p. 520, 3 figs. Beam of light is deformed by lens to inverted fan-shaped section in new headlight brought out by Edmunds & Jones Co., Detroit, Mich.; upwardly diffused light, of amber hue, shows objects in road above lamp level but does not glare.

Headlights of Vehicles and Glare (I fanali di testa dei veicoli e l'abbagliamento), G. Peri. Industria, vol. 38, no. 10, May 31, 1924, pp. 274-276, 8 figs. Discusses regulation of glare by changing position of light in reflector.

New Lamp for Headlights (Nouvelle lampe électrique pour projecteurs), A. Marsat. Revue Générale de l'Electricité, vol. 16, no. 15, Oct. 11, 1924, pp. 575-577, 7 figs. Describes Yoel Norma lamp which, by means of very exacting optical process, permits location of filament in all lamps in exactly same relation to lamp base; process of reassembling these lamps can be readily performed on routine quantity-production basis; they are in great demand by French automobile manufacturers and Parisian traction systems.

Report of Committee on Automobile Headlights —International Commission on Illumination, C. H. Sharp. Illuminating Eng. Soc.—Trans., vol. 19, no. 8, Oct., 1924, pp. 801-817. Suggested general principles of headlighting; standard specifications for headlight control and reasons for their adoption.

Specification of Laboratory Tests for Approval of Electric Headlighting Devices for Motor Vehicles, U. S. Bur. Labor Statistics—Bul., no. 350, Jan. 1924, 5 pp., 1 fig. Tentative American standard approved Nov. 11, 1922, by Am. Eng. Standards Committee.

Helios. See German.

Hillman. Hillman Cars for 1925. Autocar, vol. 53, no. 1508, Sept. 12, 1924, pp. 467-468, 4 figs. Specifications: 11-hp. engine, four cylinders, 65 by 120 mm., detachable head, side valves, semi elliptic front and rear springs.

The Hillman Car. Auto-Motor Jl., vol. 29, no. 25, June 19, 1924, pp. 517-519, 9 figs. Describes well-designed all-weather vehicle with most efficient power and transmission plant; 4-cylinder engine, with bore of 65 mm. and piston travel of 120 mm.; R. A. C. rating of 10.4 hp.

Hispano-Suiza. See Racing.

Humber. Humber Car Refinements. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 583-584, 6 figs. Improved editions of 8, 12 and 15.9 hp. models; four-wheel brakes on latter, and a new form of side panel for touring bodies.

The 11.4 H.P. Humber, E. N. Duffield. Auto-Motor Jl., vol. 29, no. 26, June 26, 1924, pp. 531-533, 5 figs. Car is smaller edition of 15.9; the four cylinders have their inlet valves overhead and lower section of crankcase is flared to form clutch pit, continued to constitute lower portion of gear box.

Imperia. The 11-24 H.P. Imperia Car. Auto-Motor Jl., vol. 29, no. 45, Nov. 6, 1924, pp. 981-983, 9 figs. Particulars of Belgian vehicle, having new type of slide-valve engine and a distinctive frame construction. Capable of speed of 60 m.p.h. and a gasoline mileage of 35 miles to gallon, with oil consumption of a gallon to 1000 miles.

Indianapolis Race. Reliability Is Outstanding Characteristic of Cars in This Year's Race, P. Dumas. Automotive Industries, vol. 50, no. 23, June 5, 1924, pp. 1213-1215, 6 figs. All but five of 22 entrants were running at finish of 1924 Indianapolis; average total time at pits is only 6.5 min. per car; Duesenberg supercharger proves worth.

Inspection. Inspection Methods Symposium, C. S. Stark, A. H. Frauenthal and C. J. Jones. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 156-162, 4 figs. Series of papers on inspection of processed materials, influence of numerous handlings on inspection cost, and maintenance of high-quality production.

Interchangeable Manufacture. Interchangeable Manufacture in the Automobile Industry (Austauschbare Fertigung im Automobilbau), P. Wolfram. Werkstattstechnik, vol. 18, no. 24, Dec. 15, 1924, pp. 729-736, 63 figs. Describes practice of the Rhenish Automobile Corpn. (Rabag), manufacturers of Bugatti cars, Mannheim, Germany; machining of bearing linings, claw couplings, connecting rods, striker clutches, camshaft casings, main bearings on crankcase, and cylinders.

Isotta Fraschini. The Isotta Fraschini Car. Auto-Motor-Jl., vol. 29, no. 46, Nov. 13, 1924, pp. 1001-1003, 9 figs. Particulars of latest model of an Italian vehicle, the 44.8-hp. straight eight.

Jordan Eight. Jordan Eight, Added to Lines of Sixes, Now in Production, D. Blanchard. Automotive Industries, vol. 51, no. 8, Aug. 21, 1924, pp. 352-354, 3 figs. L-head design is used in new engine, which has piston displacement of 268.6 cu. in. and N. A. C. C. rating of 28.8 hp.; actual hp. 74 at 3000 r.p.m.; crankshaft is carried in five bearings.

Lambda. See Lancia.

Lancia. The Lancia "Lambda" Car. Auto-Motor Jl., vol. 29, no. 4, Jan. 24, 1924, pp. 71-74, 12 figs. Outstanding features are construction of frame and body as one unit, and arrangement of 4-cylinder engine with pairs of cylinders set at an angle, thus keeping crankshaft very short and stiff, with minimum of whip on bearings. Weight, 21 cwt. complete, 2.12-liter engine, speed 70 m.p.h. with torpedo body and 60 m.p.h. with saloon top.

Lea & Francis. See Light.

Light. The German Light-Automobile Industry (Die deutsche Kleinauto-Industrie). Allgemeine Automobil-Zeitung, vol. 25, nos. 16 and 17, Apr. 19 and 26, 1924, pp. 17-28 and 24-28, 45 figs. Details of different German makes in alphabetical order; tabular data on German light automobiles up to 6 hp.

The 9.8 H.P. Lea and Francis Chassis. Automobile Engr., vol. 14, no. 188, Apr. 1924, pp. 94-101, 17 figs. Light car in which good performance has been secured by reducing dead weight.

See also German; Rover; Windsor.

Light Metals, Use of. Light Metals at the Automobile Show of 1924 (Les métaux légers au Salon de l'Automobile de 1924), R. de Fleury. Technique Moderne, vol. 16, no. 23, Dec. 1, 1924, pp. 811-814, 2 figs. Discusses increased use of light metals in automobile construction for lightening masses in motion, such as connecting rods, pistons, wheels, brakes, etc.

Locomobile. Locomobile Makes Many Detailed Changes to Lengthen Life of Car, P. M. Heldt. Automotive Industries, vol. 51, no. 9, Aug. 28, 1924, pp. 393-396, 8 figs. Six-cylinder engine now develops as high as 107 hp. on brake at 2150 r.p.m. and four-passenger stock car said to be capable of speed of 76 m.p.h.; frame stiffened and potential sources of noise eliminated; aluminum pistons, full pressure lubrication, and self-adjusting spring shackles adopted.

Lubrication. Saving Lubricant. Motor Transport (Lond.), vol. 39, no. 1017, Aug. 25, 1924, pp. 245-247, 8 figs. Details of system that eliminates need for lubricating many parts of chassis.

Machining of Parts. The Machining of Automobile Parts. Werkstattstechnik, vol. 18, nos. 23 and 24, Dec. 1 and 15, pp. 708-728 and 748-775, 342 figs. Contains articles on machining of aluminum pistons, connecting rods, crankshafts, grinding practice in automobile industry; production of steel plate for bodies; machine tools in automobile industry; production of steel plate for bodies; machine tools in automobile industry; machining of front and rear axles; boring of automobile parts; making molds for automobile tires, etc.

Manufacture. Building 80 Cars a Day in Toronto's Ford Plant, H. P. Armson. Can. Machy., vol. 31, nos. 7 and 8, Feb. 14 and 21, 1924, pp. 15-19 and 13-17, 6 figs. Description of progressive operations involved in assembling cars at new Danforth Ave. plant of Ford Motor Co. of Toronto, Can., and labor-saving devices used to aid production.

Marmon. Changed Body Lines Characterize New Marmon Model, B. M. Ikert. Automotive Industries, vol. 51, no. 19, Nov. 6, 1924, pp. 796-798, 4 figs. Engine has integral inlet manifold; control members rearranged, solid propeller shaft adopted and steering gear redesigned to meet requirements of balloon tires.

Mathis. A New Mathis. Autocar, vol. 53, no. 1510, Sept. 26, 1924, p. 537, 3 figs. Particulars of a French production of which four cylinders, four speeds, double lubrication system, and soft tires are prominent features.

Markwell. Maxwell Practice Illustrates a New Method of Engine Mounting, P. M. Heldt. Automotive Industries, vol. 50, no. 14, Apr. 3, 1924, pp. 761-763, 4 figs. Vibration is reduced in new Maxwell car; at rear power plant has swivel support on frame about which it is free to move, since it is not secured rigidly at forward end.

Maybach. German-Built Automobile Operates Without Shifting Gears, B. R. Rierfeld. Automotive Industries, vol. 51, no. 19, Nov. 6, 1924, pp. 810-815, 14 figs. Maybach car uses planetary low-speed gear only under extremely difficult road conditions; electric starter normally stars car on direct drive; engine and carburetor possess original features.

The Maybach Car, 1924 Model (Der Maybachwagen Modell 1924). Motorwagen, vol. 27, no. 30, Oct. 31, 1924, pp. 550-552, 5 figs. Details of chassis.

The 22/70 Hp. Gearless Passenger Automobile by Maybach Motorenbau Co. (Der 22/70 PS-Personenkraftwagen ohne Schaltung der Firma Maybach-Motorenbau G. m. b. H., Friedrichshafen, a.B.). Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 33, Aug. 16, 1924, pp. 841-848, 22 figs. New design for high average speed with four-wheel brakes; speed-change gear is replaced by coupling with planetary gears; four-stroke six-cylinder gasoline engine; details of chassis and engine.

The 22/70 Maybach Motorcar. Eng. Progress, vol. 5, no. 10, Oct. 1924, pp. 209-213, 12 figs. Purpose of design; engine and carburetor; gear; frame; brakes; brake compensation; accessories.

Mercedes. See Racing.

Minerva. The 30 H.P. Minerva. Auto-Motor Jl., vol. 29, no. 34, Aug. 21, 1924, pp. 705-707, 9 figs. Design and construction of six-cylindered 30-hp. Minerva automobile with silent sleeve-valve engine and four-wheel braking.

Mölkamp. The Mölkamp Six-Cylinder Sporting Car (Der Mölkamp-Sechszylinder-Sportwagen), Mierwald. Allgemeine Automobil-Zeitung, vol. 25, nos. 46 and 47, Nov. 15 and 22, 1924, pp. 15-17 and 25-26, 10 figs. Design and construction of sport car built by Möllenkamp A. G., Düsseldorf; 10/50 hp. at 2900 r.p.m.

Moon. The Latest 20 H.P. Moon. Auto-Motor Jl., vol. 29, no. 33, Aug. 14, 1924, p. 688, 2 figs. Describes latest model of Moon car, including four-wheel brakes operated on Lockheed hydraulic system, six-cylindered Continental motor, bore 3⅛ in. and stroke 4¼ in., of 54 hp. at 2500 r.p.m.; power transmitted through Borg & Beck 10-in. dry-plate clutch and three-speed Warner gear box.

Morris-Cowley. Morris Cars. Auto-Motor Jl., vol. 29, no. 24, June 12, 1924, pp. 499-501, 10 figs. Particulars of latest models. Made in two types, the Cowley, having 11.9-hp. engine, 69.5 bore and 102 stroke, and the Oxford, rated at 14.28 hp., and having bore of 75 and a stroke of 102.

The 11.9 H.P. Morris-Cowley Chassis. Automobile Engr., vol. 14, no. 187, Mar. 1924, pp. 64-72, 13 figs. Four-cylinder engine, with cylinders cast in block with upper half of crankcase, is bolted to 3-speed gear box, power being transmitted to bevel-driven rear axle through enclosed propeller shaft; frame is intended to take four-seater body.

Nash. Nash Adds Smaller Six and Drops Four Cylinder Models, D. Blanchard. Automotive Industries, vol. 51, no. 5, July 31, 1924, pp. 231-236, 10 figs. Four-wheel brakes and balloon tires on disk wheels, steering gear redesigned with larger ratio.

New York Show. Dull Finishes Gaining in Favor, Closed Car Exhibit Shows, H. Chase. Automotive Industries, vol. 51, no. 14, Oct. 2, 1924,

pp. 589-593, 26 figs. Body design trends brought out at Closed Car Show of New York Automobile Merchants Assn., Sept. 27-Oct. 4, 1924. Great increase in number of semi-lustrous satin finishes; number of one-piece windshields increases; more greens and grays for body colors used; more nickel parts; more decorative visors.

Interest Focuses on New Car Announcements. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 78-81, 3 figs. Details of new models shown for first time at New York Show; features of improvements.

1925 Cars. Advance Details of 1925 Cars. Autocar, vol. 53, No. 1509, Sept. 19, 1924, pp. 505-512, 16 figs. Particulars of new cars of British, French, Belgian, and American manufacture produced as 1925 models, including Lea-Francis, Imperia, Sunbeam, Reo, Berliet, Austin, and Bean.

Oakland. The New Oakland Six. Auto-Motor Jl., vol. 29, no. 1, Jan. 3, 1924, pp. 7-10, 11 figs. Fine example of 6-cylinder design; four-wheeled braking; low running costs.

Olympia Show, England. Front Brakes and Balloon Tires Chief Novelties at Olympia Show, M. W. Bourdon. Automotive Industries, vol. 51, no. 19, Nov. 6, 1924, pp. 799-802, 13 figs. Only a few servo-mechanisms in evidence; fabric bodies and others with steel frames have increased in popularity; reappearance of drop base rims.

Motor Car Show at Olympia. Engineer, vol. 138, nos. 3590 and 3591, Oct. 17 and 31, 1924, pp. 434-436 and 470-473, 22 figs. Outstanding features are 4-wheel brakes, more comfortable body work, and increase in 6-cylinder models; details of different exhibits.

The Automobile Show. Autocar, vol. 53, nos. 1513 and 1514, Oct. 17 and 24, 1924, pp. 754-778 and 831-882, 401 figs. A stand-to-stand description of car and chassis exhibits at Olympia Exhibition.

The Olympia Motor Show, 1924. Auto-Motor Jl., vol. 29, nos. 42 and 43, Oct. 16 and 23, 1924, pp. 875-900 and 917-939, 186 figs. List, alphabetically aranged, of the various cars exhibited, giving in a suminarized form their special features.

The Olympia Show. Automobile Engr., vol. 14, no. 195, Nov. 5, 1924. Review of exhibits under following heads: Summary of trend of design, p. 314; engines, pp. 315-332, 46 figs.; gear boxes, pp. 332-336, 20 figs.; rear axles, pp. 336-338, 7 figs.; frames, pp. 338-339, 5 figs.; steering gears, pp. 340-341, 4 figs.; front axles, pp. 341-343, 8 figs.; brakes, pp. 343-348, 17 figs.; springs and suspension, pp. 348-350, 8 figs.

See also Accessories; Bodies.

Overland. Overland Cars. Auto-Motor Jl., vol. 29, no. 12, Mar. 20, 1924, pp. 245-248, 9 figs. Particulars of latest models. Four-cylinder high-speed engine with 3⅝-in. bore and 4-in. stroke.

Oxford. See Morris-Cowley.

Painting and Varnishing. Automatic Equipment Cuts Painting Cost. Iron Age, vol. 114, no. 10, Sept. 4, 1924, pp. 555-557, 4 figs. How frames for Ford cars are cleaned, painted, dried, and delivered to freight-car door at rate of 10 a minute by means of a new painting and conveying unit recently placed in operation.

The Painting and Varnishing of Motor Bodies, W. L. Lewis. Automotive Mfr., vol. 66, nos. 8 and 9, Nov. and Dec., 1924, pp. 5-7 and 25, and 23-25. Essential differences in present conditions and those in coach-builder's time; me hanical methods of painting; paint-shop equipment; dipping processes.

Palladium. The 12 H.P. Palladium Chassis. Automobile Engr., vol. 14, no. 194, Oct. 1924, pp. 284-292, 16 figs. Details of component-built vehicle.

Panhard. A New 10 H.P. Panhard. Autocar, vol. 53, no. 1508, Sept. 12, 1924, pp. 460-461, 3 figs. Specifications: 10-hp. engine of four cylinders, 65 by 105 mm.; four-speed gear box in unit with engine; brakes on all four wheels.

The 14-20 H.P. Panhard. Auto-Motor Jl., vol. 29, no. 2, Jan. 10, 1924, pp. 29-32, 11 figs. Details of French-built sleeve-valve-engined car.

Paris Show. Four-Wheel Brakes and Fabric Car Bodies Stand Out as Features of French Production, W. F. Bradley. Automotive Industries, vol. 51, no. 18, Oct. 30, 1924, pp. 765-769, 19 figs. Features of exhibits at Paris show; 122-cu. in. car popular; numerous servo-mechanisms; duralumin connecting rods; light alloys for chassis construction.

19th International Automobile Show (La XIX^{e} Exposition Internationale de l'Automobile, Paris, Oct. 2-12, 1924), Martinot-Lagarde. Technique Moderne, vol. 16, no. 21, Nov. 1, 1924, pp. 765-767. Review of exhibits, including engines, chassis, transmissions, suspensions, brakes, bodies, and accessories.

Novel Brake Mechanism and Dozen New Models Are Paris Show Features, W. F. Bradley. Automotive Industries, vol. 51, no. 15, Oct. 9, 1924, pp. 633-634, 1 fig. Great increase in fabric bodies and gain in overhead valve engines.

Paris Automobile Show, 1924 [Le XIX^{e} Salon de l'Automobile et du Cycle. Véhicules de tourisme (Paris), 1924)], G. Delanghe. Génie Civil, vol. 85, nos. 16, 17 and 18, Oct. 18, 25 and Nov. 1, 1924, pp. 333-343, 360-371 and 394-403, 94 figs. Review of exhibits, including cycle cars, small and light cars, medium and high-power cars; carburetors; electric starters; lighting equipment; transmissions; suspensions; accessories.

The Paris Automobile Show. Automobile Engr., vol. 14, no. 196, Nov. 1924, pp. 368-371, 17 figs. Few novelties; concentration on manufacture of standard models.

The Paris Salon. Autocar, vol. 53, no. 1512, Oct. 10, 1924, pp. 691-698, 23 figs. French automobile industry in a flourishing condition. Rival schools of thought as regards future developments. Balloon tires controversy; question of world trade. Particulars of small cars at show. Renault oil purifier.

See also Bodies.

Parts. Parts Manufacturers Exhibit New Products. Automotive Industries, vol. 50, no. 2, Jan. 10, 1924, pp. 81-84, 5 figs. Seven-speed gearset, taxicab engine, new drag-link design, oil purifier, car heater, brake equalizer, and windshield cleaner are among new units presented at New York Show.

Parts, Swaging of. Swaging with Special Reference to Automobile Parts (Das Schmieden im Gesenk unter besonderer Berücksichtigung der Gesenkschmiedeteile für die Automobilindustrie), C. Müller. Kruppsche Monatshefte, vol. 5, Dec. 1924, pp. 249-257, 24 figs. Compares proper and defective methods of swaging as applied to multiple throw cranks and other parts.

Peerless. Straighter Body Lines and Re-designed Engine Characterize New Peerless Eight, D. Blanchard. Automotive Industries, vol. 51, no. 21, Nov. 20, 1924, pp. 875-878, 6 figs. Detachable cylinder-head construction adopted, and timing and explosion sequence changed; heavier crankshaft with counterweights and larger bearings used.

Peugeot. See Racing.

Pierce-Arrow. Pierce-Arrow added to List of Cars Fitted with Front-Wheel Brakes. Automo-

tive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 5-6, 2 figs. Adopts construction in which operating shafts are carried on axle center; reverse Elliott knuckle has vertical axis which meets ground more than 2 in. from central point of tire contact; provision against locking front wheels considered unnecessary.

Pierce-Arrow Announces Lighter Six with L-Head Engine, D. Blanchard. Automotive Industries, vol. 51, no. 5, July 31, 1924, pp. 237-240, 4 figs. Piston displacement and weight are 30 per cent less than that of larger model which is continued. Four-wheel brakes, balloon tires, and torque bar are features.

Plate Glass for. See GLASS MANUFACTURE, Automobile Plate Glass.

Pressed-Metal Parts. The Use of Pressed-Metal Parts for Saving in Weight and Manufacturing Costs of Automobiles (Gewichtsersparnis und Verbilligung der Konstruktion von Kraftwagen durch Verwendung von Blechpressteilen), P. Friedmann. Motorwagen, vol. 27, no. 28, Oct. 10, 1924, pp. 506-510, 28 figs. Examples of pressed-metal parts which can be used in automobile construction.

Producer-Gas. See Charcoal-Producer-Gas-Burning.

Race Track for. See RACE TRACKS.

Racing. Mercedes with Supercharger Engine Wins Sicilian Classic, W. F. Bradley. Automotive Industries, vol. 50, no. 21, May 22, 1924, pp. 1116-118, 8 figs. Results of 395-mi. race; air filters and dry sump lubricating systems employed on some cars entered; those who use servo mechanisms find them advantageous; details in brief of Fiat, Peugeot, Mercedes, and Hispano-Suiza cars.

Straight Eight, Supercharged Car Wins Grand Prix, 503 Mile Race, W. F. Bradley. Automotive Industries, vol. 51, no. 6, Aug. 7, 1924, pp. 276-279, 4 figs. Details of Sunbeam, Fiat, Alfa, Bugatti, Delage, Schmid, and Miller cars and their behavior.

See also A. C. Racing; Duesenberg.

Radio Equipment. See RADIOTELEPHONY, Automobiles.

Railways, Use by. See RAILWAYS, Automobile Service.

Rear-Axle Production. Maxwell Methods of Making Rear-Axle Parts, F. H. Colvin. Am. Mach., vol. 60, nos. 15, 16, and 18, Apr. 10 and 17, and May 1, 1924, pp. 529-532, 9 figs.; 569-572, 8 figs., and 661-663, 7 figs. Apr. 10: By use of heavy swaging machines, Maxwell company has eliminated all turning except at ends, has saved 7 lb. of high-grade steel per car, and secured axle that is 25 per cent stronger than one it replaces. Apr. 17: Drilling, boring and reaming fixtures; inspection gages, and running-in of complete rear end. May 1: Rear-axle housing and drive pinion; fixtures used in production; grinding two diameters at once; special mounting for truing diamonds.

Production and Assembly of Rear Axles, H. P. Armson. Can. Machy., vol. 32, no. 26, Dec. 25, 1924, pp. 144-149, 5 figs. Account of manufacturing operations in building of Willys-Overland cars in Toronto.

Rear-Axle Shafts. Hot-Swaging of Rear-Axle Shafts, R. A. DeVlieg. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 507-510, 4 figs. Description of machines used and their mode of operation, and difficulties attendant upon their development.

See also Axles.

Renault. The Second and Third Trips Across the Sahara Desert by Automobile (Les 2e et 3e traversées du Sahara en automobile), G. Delanghe. Génie Civil, vol. 84, no. 2172, Mar. 29, 1924, pp. 293-297, 13 figs. Renault automobiles with six double wheels; details of chassis; comparison of different systems of 6-wheel chassis.

Repair Service. How Engineers Can Coöperate to Make Flat-Rate Service a Success, J. Willard Lord. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 20-22. Points out need of coöperation of engineering and maintenance; development of special tools; reduction of parts expense; price of repair parts.

Providing the Engineer with Service Data, O. T. Kreusser. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 63-67 and 73, 2 figs. Tendencies of industry; maintenance troubles; field information; recording service data; coöperation between factory and service men.

Research Laboratory. See LABORATORIES, Automobile Research.

Rickenbacker. New Rickenbacker Vertical Eight Will Supplement the Six, J. E. Schipper. Automotive Industries, vol. 50, no. 26, June 26, 1924, pp. 1369-1372, 5 figs. Airplane type of oil tubing, radiating fins on cast-aluminum oil pan, cold blast for cooling oil in summer, duplex carburetor and camshaft always immersed in oil are features.

Riding Comfort. Automobile Riding-Comfort, S. P. Hess. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 82-85, 7 figs. Important factors that determine correct chassis spring suspension. Analysis of motions of a car; periodicity machine designed to determine value of interleaf friction as a damping medium, and results obtained from tests.

Riding-Comfort Factors. Soc. Automotive Engrs. —Jl., vol. 14, no. 3, Mar. 1924, pp. 335-337 and 341. Outline of factors involved in question of riding comfort and discussion thereof.

See also ACCELEROMETERS, Automobile Acceleration, Measurement.

Riding Qualities. A Riding-Quality Indicator, E. H. Lockwood and L. B. Kimball. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 40-42, 2 figs, and (discussion), no. 6, Dec. 1924, pp. 548-553, 6 figs. A portable instrument of seismograph type designed for measuring vertical acceleration produced by body springs; employs a suspended weight from which instrument readings are made; belongs to integrating type, wherein displacements of suspended weight are automatically summed up as fast as they occur; observer has only to read recording dial at intervals to obtain a measure of total displacement, which, in turn, is translated into riding quality on an arbitrary scale; construction and uses.

Air-Springs and the Measurement of Automobile Riding-Quality, J. J. McElroy. Soc. Automotive Engrs.—Jl., vol. 15, no. 3, Sept. 1924, pp. 211-226 and (discussion) 227-228, 29 figs. Discusses load curves, and friction characteristics; describes field tests made of front-axle movements, and apparatus for these and other tests; factors that are important in measuring riding-comfort; air-spring design and construction; manufacture of air springs; installation and service.

Riding-Qualities Research, J. A. C. Warner. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 75-81, 9 figs and (discussion), no. 6, Dec. 1924, pp. 556-561, 3 figs. Ascertaining of factors that determine riding-qualities of automobiles and methods employed in studying these factors, and consideration of lines along which research should be directed in effort to improve riding conditions, are proposed with a view to encouraging further helpful discussion of riding-qualities problem.

Riley. The Eleven-Forty Riley. Auto-Motor Jl., vol. 29, no. 22, May 29, 1924, pp. 455-457, 9 figs. Light car of English manufacture; me-

chanical accuracy and efficiency have been brought to a high pitch; great comfort and roominess; engine is of monobloc construction with detachable head.

Roads, Influence on Development. The Influence of Road Conditions on the Development of the Modern Motor Vehicle, H. G. Burford. Engineering, vol. 118, no. 3078, Dec. 26, 1924, pp. 874-876, 1 fig. Consideration of nature of development of design which may be attributed largely, if not entirely, and indirectly, if not directly, to influence of road conditions.

Rover. A New 14-45 h.p. Rover. Autocar, vol. 53, no. 1510, Sept. 26, 1924, pp. 553-558, 11 figs. See also Auto-Motor Jl., vol. 29, no. 40, Oct. 2, 1924, pp. 829-831, 7 figs. Details of novel two-liter, 4-cylinder, four-speed model with four-wheel brakes.

Care and Maintenance of the 12 h.p. Rover. Autocar, vol. 52, no. 1473, Jan. 11, 1924, pp. 59-62, 10 figs. Hints and tips prepared to enable owner-drivers to secure longest and most efficient service from 12-hp. and the more recent 14-hp. Rover cars.

Oil Cooled Pistons and One Overhead Camshaft Used in New 14-45 Hp. Rover, M. W. Bourdon. Automotive Industries, vol. 51, no. 21, Nov. 20, pp. 880-885, 6 figs. Single-point lubrication for engine, clutch, and gearset; valves inclined at angle of 45 deg.; cylinder head is internally machined and detachable.

The 14 H.P. Rover. Auto-Motor Jl., vol. 29, no. 20, May 15, 1924, pp. 413-416, 11 figs. Also Automobile Engr., vol. 14, no. 189, May 1924, pp. 126-134, 14 figs. Monobloc engine with detachable head and side-camshaft-operated side-by-side valves; cylinders of 75 mm. bore and stroke 130; 40 b.hp. obtained.

The Rover Eight. Auto-Motor Jl., vol. 29, no. 29, July 17, 1924, pp. 599-601, 9 figs. Latest model of light car, horizontal opposed cylinder, twin engine, 1300 cc.; gearing, three forward and one reverse; made by Rover Co., Ltd., Coventry.

The Rover "Nine." Auto-Motor Jl., vol. 29, no. 23, June 5, 1924, pp. 477-479, 10 figs. New model, with 4-cylindered overhead-valve motor-cooled engine in 1100-cc. class; develops 20 hp. at 3000 r.p.m.

Rumpler. The Rumpler Cars 1924 (Die Rumplerwagen 1924), R. Conrad. Motorwagen, vol. 27, no. 34, Dec. 10, 1924, pp. 673-684, 10 figs. Describes latest model of Rumpler streamline car, first model of which was developed in 1922.

Sangiusto. New Type of Automobile (Nuovo tipo di automobile). Industria, vol. 38, no. 8, Apr. 30, 1924, pp. 224-225, 2 figs. Details of 8-hp. car made by Sangiusto Company, Milan; car has box-birder type of chassis, with engine mounted at rear.

Screens. Rear Screen Equipment. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 621-623, 10 figs. Brief review of latest developments in fittings for protection of rear seat occupants.

Service Methods. A Modern Motor-Car Service-System, H. N. Davock. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 562-566, 5 figs. Problems encountered in dealing with service at factory and in field; evolution and inauguration of standard specifications and prices; how proper use of them has been successfully met; education of dealers in use of standard specifications and prices.

Shafts, Stiffness of. Calculating the Stiffness of Shafts, F. A. W. Livermore. Automobile Engr., vol. 14, no. 191, July 1924, p. 197. Gives simplified formula.

Sheet Steel for. See STEEL, Automobile.

Shimmying, Balloon-Tire. Cause and Effects of Shimmying. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 501-510, 4 figs. Contains following two papers; Adapting Motor Cars to Low-Pressure Tires, J. E. Hale; Correction of Balloon-Tire Shimmying, R. B. Day; and discussion.

Shipping. Ppreparing and Loading Automobiles for Shipment, B. R. Moore. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 511-515, 9 figs. Procedure at plant; double and half decking; "side" and combination loading; inspection methods; oversea shipment; loss and damage.

Shock Absorbers. Making Shock Absorber Parts for Light Cars. Can. Machy., vol. 32, no. 16, Oct. 16, 1924, pp. 19-20 and 42, 4 figs. Metal working operations at Hamilton, Ont., plant of Hassler Co. Spiral telescoping spring used is made from chrome vanadium steel 7/16-in. hot rod, wire drawn to a diameter of 25/64 in.

Shock-Absorbing Devices. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 587-589, 19 figs. Consideration of some of the various types of mechanism used to damp vibration of springs.

The D. N. Shock Absorber. Auto-Motor Jl., vol. 29, no. 27, July 3, 1924, pp. 562-563, 2 figs. Principle underlying D. N. device is that of allowing compression or extension of spring to be always free and unrestrained while rebound only and in each direction is checked or damped.

Singer. The Singer Six. Auto-Motor Jl., vol. 29, no. 16, Apr. 17, 1924, pp. 327-331, 14 figs. 15-hp. 6-cylindered model of British firm; cylinders bored to 65 mm. diam., and crank throw of 100 mm.

Specifications and Design. Trends in Passenger Car Design. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 393-418, 9 figs. Statistics on prices; progress of design shown by trend studies; American passenger-car chassis specifications; engine specifications; taxicab, steam-passenger-car and gasoline-railcar specifications; British and Continental European specifications.

Speed and Movement Recorder. The Controlograph. Auto-Motor Jl., vol. 29, no. 52, Dec. 25, 1924, p. 1132, 3 figs. Device for recording movements and speed of motor vehicle; record is produced by three means, clockwork, transmission of car, and vibration arising from passage of vehicle over road.

Speedometers. See SPEEDOMETERS.

Sport. See Bignan Sport; Mölkamp; Sunbeam.

Springs. See SPRINGS, Automobile; Leaf.

Stability. Conditions of Stability of an Automobile (Ueber die Stabilitätsbedingungen des Motorwagens), P. Jaray. Motorwagen, vol. 27, nos. 17 and 18, June 20 and 30, 1924, pp. 291-294 and 305-308, 3 figs. Properties of stability and factors determining it, including equations of motion; disturbing conditions during run, aerodynamic effects, acceleration; braking; etc.

Standard. The 14 H.P. Standard. Auto-Motor Jl., vol. 29, no. 41, Oct. 9, 1924, pp. 861-863, 9 figs. Particulars of latest model of a Coventry (Eng.) firm. Engine has four cylinders arranged in monobloc construction, bore 75 mm. and piston travel 110 mm.

Standards. Standards Committee Divisions Reports. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 37-56, 13 figs. Reports of Divisions on agricultural-power equipment, axle and wheels, frames, lubricants, non-ferrous metals, motorboats, passenger-car bodies, parts and fittings, storage batteries, screw threads, tires and rims.

Star. New 14-30 hp. Star. Autocar, vol. 53, no. 1510, Sept. 26, 1924, pp. 532-533, 6 figs. Medium-powered 4-cylinder car of modern design available in extended range. Four-wheel brakes standardized.

Starting and Lighting Equipment. Electric Starting and Lighting Equipment, A. C. Burgoine. Automobile Engr., vol. 14, no. 186, Feb. 1924, pp. 54-61, 19 figs. What a lighting set consists of; electric starter; standardization of equipment; dynamo drives and regulation; starter mounting and drives; dynamo-coil ignition; future developments.

Electrical Manufacturers and Service Men Adjust Differences, C. P. Shattuck. Automotive Industries, vol. 51, no. 13, Sept. 25, 1924, pp. 563-566, 4 figs. Report of standards committee of Automotive Elec. Assn., on classification of standard lighting generators, starting motor, and recommended practice in wiring.

Steel for. See STEEL, Automobile.

Steering Gears. New Lavine Steering Gear Moves Wheels Faster Near End of Range of Motion, B. M. Ikert. Automotive Industries, vol. 51, no. 10, Sept. 4, 1924, pp. 440-441, 2 figs. Features of new series Lavine steering gears recently brought out by Lavine Gear Co., Milwaukee. Provision made for taking up both circumferential and axial lost motion. Variable reduction ratio takes care of new conditions arising from adoption of low-pressure tires.

Steering-Gear Analyses, F. F. Chandler. Soc. Automotive Engrs.—Jl., vol. 14, no. 6, June 1924, pp. 585-590 and 648, 8 figs. Describes set of automatic recording instruments being developed by author assisted by H. A. Huebotter, that will record not only physical effort needed to steer automobile, but simultaneously, forces and shocks imposed upon entire steering system, so that such records will constitute basis for steering-system design; study of helix characteristics; possibilities of producing variable-ratio helix that gives great mechanical advantage in extreme positions.

The Graphic Determination of the Coefficients of Transmission of Rocking-Lever Steering Gear (Beiträge zur graphischen Ermittlung der Bewegungsgrössen von Schwinghebelsteuerungen), Rob. Kluger. Motorwagen, vol. 27, no. 34, Dec. 10, 1924, pp. 674-678, 7 figs. Calculations based on two articles by Prof. Doerfel published in Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 20, and Maschinenbau, vol. 3, no. 8.

Storage-Battery. Verified Tests of Storage-Battery Vehicles (Les essais controlés de véhicules électriques à accumulateurs, octobre 1924), Ch. Dantin. Génie Civil, vol. 85, no. 26, Dec. 27, 1924, pp. 589-596, 22 figs. Rules and results of tests by Union des Syndicats de l'Electricité; details of competing vehicles, storage batteries, governing apparatus, power consumption, etc.

Streamline. A Streamlining Development. Autocar, vol. 52, no. 1486, Apr. 11, 1924, pp. 662-664, 7 figs. Unconventional body designed by a Danish engineer, P. Forostovsky, Jr., and fitted to a 2-liter Bignan chassis; head resistance diminished, resulting in reduced power and gasoline consumption, but with no loss of comfort.

The Future High-Speed Automobile (Der künftige Schnellkraftwagen), A. Persu. Allgemeine Automobile-Zeitung, vol. 25, no. 18, May 3, 1924, pp. 25-26, 2 figs. Author states future high-speed car will be streamline type, in which all four wheels are built within streamline form, the two rear driving wheels will be less distance apart than front wheels, passenger seats will be in front and power plant in rear.

See also Rumpler.

Studebaker. New Features Involved in Studebaker Brake Linkage and Transmission. Automotive Industries, vol. 51, no. 13, Sept. 25, 1924, pp. 570-571, 3 figs. Details of four-wheel brake system which operates through a servo mechanism, and which is optional on all models. Transmission on Standard Six is very similar to that on other models.

New Studebaker Models Have Pressure Lubrication and More Power, D. Blanchard. Automotive Industries, vol. 51, no. 12, Sept. 18, 1924, pp. 512-518, 10 figs. Balloon tires, transmissions integral with engines and automatic spark timing are regular features, while four-wheel brakes with servo mechanism come as an extra. Bodies and radiators changed.

The Studebaker Light Six. Auto-Motor Jl., vol. 29, no. 35, Aug. 28, 1924, pp. 725-727, 11 figs. Describes latest models of Canadian-built car; wheelbase is 9 ft. 4 in.; engine and clutch are one unit, and gear box separately mounted with universally jointed shaft transmitting power to semi-floating live axle; engine has its six cylinders cast en bloc with detachable head; bore, 79 mm.; stroke, 114 mm.

Three Studebaker Sixes. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 641-643, 10 figs. Standard six rated at 27.2 hp., special six rated at 29.3 hp., and big six 35.9 hp.; hydraulic four-wheel brakes and low-pressure tires.

Sunbeam. Three-Litre Super-Sports Sunbeam. Autocar, vol. 52, no. 1489, May 2, 1924, pp. 782-784, 7 figs. Standardization of a new edition of 6-cylinder 16/50-hp. car for high speed touring; improvements to 20/60-hp. model.

See also Grand Prix.

Suspension. A Promising Spring Suspension System. Motor Transport (Lond.), vol. 38, no. 1006, June 9, 1924, pp. 703-704, 2 figs. Details of Farnsworth design. Improved riding qualities obtained by eliminating unsprung weight and providing independent springing for each wheel.

Road Spring Lubricant Bath. Autocar, vol. 53, no. 1510, Sept. 26, 1924, p. 551, 2 figs. Describes a new form of quickly removable spring cover called Metalligator, which makes instant inspection possible. Made of steel, aluminum, or nickel silver

The Gattie Suspension System. Automobile Engr., vol. 14, no. 196, Nov. 1924, pp. 362-363, 1 fig. Modified design based on road experiences; has both vertical and lateral flexibility.

Talbot. The 16-50 H.P. Six-Cylindered Talbot. Auto-Motor Jl., vol. 29, no. 30, July 24, 1924, pp. 619-621, 10 figs. Also Autocar, vol. 53, no. 1498, July 4, 1924, pp. 24-25, 5 figs. New monobloc design with detachable head and overhead valves; cylinders have bore of 70 mm. and piston stroke of 110 mm.

Tatra. See German.

Templar. New Templar Has Four-Wheel Brakes and 6-Cylinder Engine. Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 15-16, 1 fig. Reorganized company brings out model with little resemblance to old line; power plant is L-head type with 3½-in. bore and 5-in. stroke; 7 bearing crankshaft used; braking system built by U. S. Axle Co.

Tires. See TIRES, RUBBER.

Torque, Caring for. Taking the Torque. Auto-Motor Jl., vol. 29, no. 3, Jan. 17, 1923, pp. 55-57, 10 figs. Some examples of design in connection with taking of torque reaction in motor power transmission.

Trailers. A Dumping Trailer for Use With a Light Car, G. A. Luers. Am. Blacksmith & Motor Shop, vol. 23, no. 3, Mar. 1924, pp. 19-20, 4 figs. Describes trailer for use with light passenger automobile; capacity 1 cu. yd., which in gravel is about 1800 lb.

Transmissions. A Mechanical Continuous-Torque Variable-Speed Transmission, E. B. Sturges. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 86-92 and 104, 16 figs.

and (discussion) no. 4, Oct. 1924, pp. 343-345. Describes variable-speed power transmission which consists primarily of a power-transmitting body called the mutor, inclosed in and concentric with a metallic sphere. Its characteristics and advantages. General discussion of kinematics of subject, and detailed descriptions of single-sphere heavy-duty-type transmission and medium-duty type.

A New Type of Constant-Mesh Transmission, W. A. McCarrell. Soc. Automotive Engrs.—Jl., vol. 15, no. 1, July 1924, pp. 101-104, 2 figs. Resembles conventional three-step-and-reverse type, but differs from it in that slip collars rather than gears on upper shaft are moved to engage the various reduction sets. Details of construction and characteristics. Views shown of both helical and spur-gear types.

A Study of an Unusual Transmission, J. Younger. Am. Mach., vol. 61, nos. 9 and 10, Aug. 28 and Sept. 4, 1924, pp. 337-340 and 375-377, 17 figs. Description of method of functioning of Chandler transmission and some of the manufacturing operations on it.

Continuously Variable Transmission Developed in America. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, pp. 674-675, 2 figs. Weiss invention has driving member in form of hemispherical shell within which is body known as mutor; latter unit is of ring, wheel, or disk form and rotates about its own axis on anti-friction bearing; stops car on hill without use of brakes.

McCarrell "Constantmesh" Transmission, W. A. McCarrell. Am. Mach., vol. 61, no. 21, Nov. 20, 1924, pp. 809-811, 2 figs. Transmission by which changes of speed can be effected without appreciable noise or shock; either spur or helical gears can be used.

Modern Transmission Design, P. M. Heldt. Automotive Industries, vol. 61, no. 1, July 3, 1924, pp. 2-21, 31 figs. Sliding-pinion change gear has many good points but involves some disadvantages; study of theory and practice reveals possibilities of other types. Automatic and continuously variable transmissions. Transmission development. Inertiamass type of transmission. Trend of recent designs toward gear box weight reduction.

New Transmission Allows for Changing Gears Without Interrupting Torque. Automotive Industries, vol. 51, no. 3, July 17, 1924, pp. 144-145, 3 figs. New Clutch-transmission combination developed by Automatic Clutch & Transmission Co. Direct and hydraulic drive combined in such a way that latter works automatically at low speeds in starting and under heavy load.

The Chandler Transmission. Auto-Motor Jl., vol. 29, no. 2, Jan. 10, 1924, p. 35, 4 figs. Describes new type of gear which will be incorporated in 1924 models of Chandler car; wheels always in mesh.

Variable Transmission. Autocar, vol. 52, no. 1485, Apr. 4, 1924, p. 602, 3 figs. Describes device now under test to simplify gear box and back axle of car.

Variable Transmission, G. Constantinesco. Automobile Engr., vol. 14, nos. 185, 186, and 187, Jan., Feb. and Mar. 1924, pp. 10-14, 39-44 and 76-81, 43 figs. Jan.: Discusses principle of Constantinesco converter; application to traction purposes. Feb.: Analysis of converter from automobile point of view. Mar.: Analysis of behavior of converter with regard to remaining conditions.

Tropical. Design of Cars for Use in the Tropics Needs to be Changed, F. A. S. Acres. Automotive Industries, vol. 51, no. 6, Aug. 7, 1924, pp. 286-290. Describes types of cars best suited for British colonies.

Two-Wheeled. A Revolutionary Proposal, P. Schilovsky. Autocar, vol. 52, no. 1490, May 9, 1924, pp. 833-835, 3 figs. Advantages and possibilities of gyroscopic two-wheeled car, and its main principles of design and operation. Details of an experimental model.

Unic. The 12-23 H.P. Unic. Auto-Motor Jl., vol. 29, no. 38, Sept. 18, 1924, pp. 787-789, 9 figs. Particulars of touring-car chassis of an old-established French firm. Four cylinders, 70-mm. bore and 120-mm. piston stroke.

Upholstery Leather. See LEATHER, Automobile Upholstery.

Varnishes. See VARNISHES, Automobile.

Varnishing Troubles. See WOOD, Varnish-Drying Troubles.

Vauxhall. Care and Maintenance of the 14 Hp. Vauxhall. Autocar, vol. 53, nos. 1505 and 1506, Aug. 22 and 29, 1924, pp. 323-325 and 383-385, 10 figs. Advice on upkeep of four-cylinder car.

Velie. Five New Body Designs Are Featured in Velie's Line for 1925, D. Blanchard. Automotive Industries, vol. 51, no. 9, Aug. 28, 1924, pp. 409-410, 3 figs. Four-wheel brakes and balloon tires are now offered as standard equipment, radiator has been changed to improve appearance and multi-leaf chassis springs have been adopted to lessen rebound.

Wembley Exposition. See BRITISH Empire Exposition.

Wheel Manufacture. Oakland Concern Manufactures Disk Wheels. West. Machy. Wld., vol. 15, no. 3, Mar. 1924, pp. 95-96 and 108, 7 figs. Notes on manufacture of wheels produced by Westgate Metal Products Corpn. of Oakland, Cal., engaged in quantity production of disk wheels for light and heavy passenger cars, trucks and tractors.

Wheel Slip, Testing. Testing Wheel Slip. Autocar, vol. 52, no. 1474, Jan. 18, 1924, pp. 96-98, 3 figs. Results of trials with special instrument evolved to register action of differential.

Willys-Knight. The Willys-Knight Car. Auto-Motor Jl., vol. 29, no. 14, Apr. 3, 1924, pp. 285-288, 12 figs. Sleeve-valve 4-cylindered engine with cylinders of 3⅝-in. bore and 4½-in. piston stroke, developing, on the brake, 40 hp.

Windshield Design. Many Faults Are Found in Present Day Windshield Design, K. Feilcke. Automotive Industries, vol. 51, no. 4, July 24, 1924, pp. 202-205, 17 figs. Convenient and quickly operated adjusting device is one most important need today. Location and angular position of panels must be correct to insure clear vision.

Windsor. The 10-15 H.P. Windsor Car. Auto-Motor Jl., vol. 29, no. 15, Apr. 10, 1924, pp. 305-309, 11 figs. British-built car designed with a view to comfort and mechanical efficiency; 4-cylinder engine with 65-mm. bore and 102-mm. piston stroke.

Wood for Bodies. Wood for Automobile Bodies, A. T. Upson and L. N. Erickson. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 165-170, 3 figs. Results of survey made by U. S. Forest Products Laboratory of species, kinds, grades, sizes and amounts used by automotive industry; woods used for running boards and top bows; grades of lumber used; present status of body-part standardization; quality of stock required; utilization of lumber in body plants; suitability of woods for bodies.

AUTOMOTIVE FUELS. See AUTOMOBILE FUELS.

AVIATION

[See also FLIGHT.]

Aerial Navigation. Accuracy in Aerial Navigation (Ueber die Genauigkeit der Luftnavigierung),

J. Van der Hoop. Luftfahrt, vol. 28, no. 7, July 5, 1924, pp. 117-120, 8 figs. Discusses advantages of flying below and above clouds, navigation by compass, by astronomic data and by radio, and advocates radio navigation combined with flying above clouds. Translated from Het Vliegveld.

Astronomical Methods in Aerial Navigation, K. Hilding Beij. U. S. Nat. Advisory Comm. for Aeronautics—Report no. 198, 1924, 52 pp., 30 figs. Outlines various methods of determining positions and their application and value; résumé of theory of astronomical method; describes observation instruments; rapid method of finding position from altitudes of two stars; maps and map cases. Bibliography.

See also Long-Distance Navigation.

Aerial Transportation. Air Transport and Its Uses, G. H. Thomas. Inst. of Transport—Jl., vol. 5, no. 6, Apr. 1924, pp. 245-256 and (discussion) 256-261, 3 figs. Shows that this form of transport is of vital interest to British trade and commerce.

Some Technical Aspects of Air Transport, I. A. Edwards. Inst. of Transport—Jl., vol. 5, no. 2, Dec. 1923, pp. 82-87. Discusses performance, reliability, and economy of operation, the main factors which go to make a commercial machine which can be run to show profit.

Air-Mail Service. The Air Mail and the Banker. Aviation, vol. 17, no. 7, Aug. 18, 1924, pp. 886-887, 1 fig. Details of airplane arrangements for transcontinental mail service; lighting system of powerful beacons.

British Mission to Japanese Navy. The British Aviation Mission to the Imperial Japanese Navy. Roy. Aeronautical Soc.—Jl., vol. 28, no. 165, Sept. 1924, pp. 553-582 and (discussion) 582-584, 14 figs. Influences leading to formation of mission; air organization in Japanese Admiralty; organization of mission; preparations in Japan; flying section of mission; technical section; aircraft; engines; aircraft carriers; timbers; propellers; dope; etc. Aeronautical research in Japan; aircraft and airplane-engine manufacturers in Japan.

Charting Airways, United States. Charting America's Airways. Aviation, vol. 16, no. 14, Apr. 7, 1924, pp. 364-366, 3 figs. Work of Airways Section of Army Air Service in systematically charting various sections of proposed national airway system of United States; thousands of miles of flying routes and more than 100 airports surveyed.

Civil. Civil Aviation, W. S. Brancker. Eng. Jl., vol. 7, no. 5, May 1924, pp. 223-227 and (discussion) 227-230, 6 figs. Present status of aerial transportation, plans for near future and possible developments.

Civil, Great Britain. Progress of Civil Aviation in Great Britain. Aviation, vol. 17, no. 22, Dec. 1, 1924, pp. 1338-1339. British civil transport aircraft in 1923-24 flew 1,000,000 mi. carrying 15,000 passengers and 427 tons of goods.

Commercial. Adequate Landing-Fields Will Develop a Commercial-Aviation Industry, A. A. G. Fokker. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 504-506 and 510. Shows that great progress in commercial aviation has been made in America during last three years, especially with reference to Air-Mail Service. Gives instances where additional airplane routes are feasible even now in United States. European aviation development. Urges necessity for attaining ability for aircraft to fly at night and specifies advantages secured in Europe now by combined over-night railroad-and-airplane service. "Wild" flying; classification of aerial transport. Provision of landing fields throughout United States urged as a present necessity. Future aviation probabilities and development of aerial traffic.

Commercial Aviation in 1923, E. P. Warner. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 457-462. Technical developments lacking; obstacles to passenger traffic; viewpoint of public safety vs. stunting; European business method; advantages and disadvantages of subsidy; value of large-scale operation.

The Commercial Possibilities of the Airplane, A. Black and D. R. Black. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 133-137, 6 figs. Estimated capital required for financing air lines and cost of their operation; curves showing rapid drop in operating costs with increased operations; possible further increases; figures are given to show that night air service could practically eliminate competing night-letter telegraph services for distances up to about 1200 mi.; it is concluded that large-scale operations will bring airplane into direct competition with extra-fare train.

The Practical Difficulties of Commercial Flying, F. T. Courtney. Roy. Aeronautical Soc.—Jl., vol. 28, no. 157, Jan. 1924, pp. 35-41. Considers conditions under which modern commercial airplane flies; difficulties of flying an airplane through bad weather; concludes that commercial flying, before it can be a success, must operate in any weather in which other forms of transport can operate.

What Is the World Flight Going to Mean to Commercial Aviation?, A. Klemin. Automotive Industries, vol. 51, no. 9, Aug. 28, 1924, pp. 397-400, 1 fig. Fire hazard has largely been eliminated, heavy loads have been carried, variegated climates with abrupt changes can be negotiated, and speed and endurance are proved.

Commercial Aircraft Association. The Commercial Aircraft Association Plan. Aviation, vol. 16, no. 26, June 30, 1924, pp. 699-700. Code of regulations drafted for permanent organization of Commercial Aircraft Assn. of Akron, Ohio.

Developments, Canada. Further Notes on Aviation in Canada, C. W. Stedman. Roy. Aeronautical Soc.—Jl., vol. 28, no. 165, Sept. 1924, pp. 585-594, 8 figs. New fields of work; progress of research.

Developments, 1923. See AERONAUTICS, Developments.

Engineering Problems. Flying from an Engineering Standpoint, G. Loening. Aviation, vol. 17, no. 18, Nov. 3, 1924, pp. 1224-1227. Discusses safety of flying; figuring out an airplane; suppression of engine noise; etc.

High-Speed, Dangers of. Dangers of High Speed and Acrobatic Flying, L. H. Bauer. Aviation, vol. 16, no. 7, Feb. 18, 1924, pp. 174-176, 2 figs. Problems involved; what may happen at high speeds; sensitiveness to motion; sickness from ears.

Instruments Used in. See AERONAUTICAL INSTRUMENTS.

Legislation. National and International Air Legislation, P. Crichton. Aviation, vol. 16, nos. 16 and 17, Apr. 21 and 28, 1924, pp. 418-420 and 448-451. Points out legal questions involved in connection with aeronautics; summarizes progress made by common law in solving questions; and analyzes international convention relating to air navigation and also statutes heretofore passed by some of individual states in United States, as well as Winslow bill now pending before Congress.

Opinions on National Air Legislation. Aviation, vol. 17, no. 24, Dec. 15, 1924, pp. 1400-1401. Opinions of people prominent in aeronautical world.

Long-Distance Navigation. Recent Developments in the Navigation of the Air, H. B. Good-

win. U. S. Nav. Inst.—Proc., vol. 50, no. 251, Jan. 1924, pp. 68-76. Abstract of memoir of voyage by airplane accomplished by two Portuguese naval officers in spring of 1922; consideration of effect of "drift"; astronomical navigation; alternative method for zenith distance in Tropics.

Naval. Naval Aviation Today, F. W. Wead. U. S. Naval Inst.—Proc., vol. 50, no. 254, Apr. 1924, pp. 561-574. Use of individual types of lighter-than-air machines, with certain observations as to material and general doctrine.

Points to be Observed in the Advancement of Naval Aviation, T. T. Craven. U. S. Nav. Inst.—Proc., vol. 50, no. 258, Aug. 1924, pp. 1233-1248. Use of aviation to and by Navy; housing of personel; operations; anti-aircraft defense; improvement in instruments, weapons, and accessories; fire hazards, etc.

The United States Naval Air Service, 1922-23, Wm. A. Moffett. Aviation, vol. 16, no. 2, Jan. 14, 1924, pp. 34-37. Numerous new types of aircraft and engines developed for naval requirements. (Abstract.) Report of activities of U. S. Nav. Air Service during fiscal year ended June 30, 1923.

Net-Cost Calculation. The Net Cost of Aerial Transportation (Le prix de revient des transports aériens), V. Carle. Aéronautique, vol. 6, no. 56, Jan. 1924, pp. 5-12, 8 figs. Method of calculating cost and studying influence of elements of cost, such as depreciation, volume of traffic, speed, etc.

Night-Flying Equipment. Night-Flying Equipment and Operation, H. R. Harris and D. L. Bruner. Mech. Eng., vol. 46, no. 5, May 1924, pp. 274-278, 9 figs. Nonmathematical discussion of portion of work carried on by Engineering Division of Air Service; much of equipment developed has been adopted by Air Mail Service. (Abridged.)

Progress. Some Aspects of Aviation. Flight, vol. 16, no. 6, Feb. 7, 1924, pp. 78-79. General discussion on interesting aviation matters, including development of light airplanes in England and progress of aviation in United States.

Sea Power, Relation to. Relation of Air Power to Sea Power, D. W. Knox. Aviation, vol. 16, no. 9, Mar. 3, 1924, pp. 225-227. Consideration of question as to whether aviation should be taken from cognizance and control of services and be formed into independent air force; air power vs. sea power; effectiveness of aircraft and operating range; accuracy of aerial bombing.

Terminals. The Future of the Air Terminal, D. Huntington. Aviation, vol. 16, no. 16, Apr. 21, 1924, pp. 423-425, 3 figs. Importance of air terminals; influence of carriers on terminal design; evolution of field-type terminal; location with respect to community; ideal location of airport; municipal terminal idea; detail problems.

Wind, Effect in. The Effects of Wind in Aviation (Les effects du vent, en aviation), A. Lainé. Génie Civil, vol. 84, no. 5, Feb. 2, 1924, pp. 112-113, 2 figs. Effects of wind on taking off and landing; effects of wind in flight; fog and storms; drag.

AVIATORS

Breathing Apparatus for. See BREATHING APPARATUS, Oxygen, for Aviators.

AXLES

Automobile. Induced Stresses in Axles. India & East. Motors, vol. 16, no. 9, Sept. 1924, pp. 429-430, 2 figs. Determination of stress intensity; fixed axle bending; combined twisting and bending.

Automobile, Machining. See AUTOMOBILES, Axles.

Fractures. Axle Fractures and Their Causes (Ueber Achsbrüche und die Erforschung ihrer Ursachen), M. Bermann. Organ für die Fortschritte des Eisenbahnwesens), vol. 78, no. 10, Oct. 15, 1923, pp. 198-202, 1 fig. Deals with fractures in case of uniform and non-uniform steel; fractures caused by steel of unequal chemical composition.

Motor-Truck, Manufacture. See MOTOR TRUCKS, Axles, Manufacture of.

AZIMUTH

Determination. The Measurement of True Azimuths, E. M. Douglas. Military Engr., vol. 16, no. 87, May-June 1924, pp. 197-199, 3 figs. Discusses variation and uncertainty of compass bearings; advantages of recording true bearings; Polaris and Solar observations for azimuth and instruments used.

B

BAGASSE

Boiler Furnaces for. See BOILER FURNACES, Dutch Ovens for Bagasse.

Drying with Flue Gases. Calculation of the Economy of Fuel Realized on Drying Bagasse with Flue Gases, E. Mooyaart. Int. Sugar Jl., vol. 26, no. 305, May 1924, pp. 252-254. According to given calculations, if bagasse having 47 per cent of water be dried by means of flue gases to material having 15 per cent of water, an economy of 15 per cent of fuel can be realized.

Weight Obtained Per Cent Cane. Calculation of the Bagasse Obtained Per Cent Cane, A. C. Snyers. La. Planter & Sugar Mfr., vol. 72, no. 2, Jan. 12, 1924, pp. 31-33. Method of calculating weight of bagasse obtained per cent cane, when grinding with saturation, intended as indirect way of attaining per cent sucrose in can .

BAKELITE

Electrical Properties. The Electrical Properties of Bakelite (Die elektrischen Eigenschaften des Bakelits), O. Mannel. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 497-510, 13 figs. Investigation of electrical properties of bakelite at different temperatures.

BAKERIES

Materials Handling in. See MATERIALS HANDLING, Cake Bakery.

Refrigeration and Air Conditioning Refrigeration and Air Conditioning in the Bakery, C. A. Glabau. Refrig. Eng., vol. 2, no. 1, July 1924, pp. 18-21, 7 figs. Discusses place of refrigeration and air conditioning in modern bakery organization and operation.

BALANCING

Crankshafts. See CRANKSHAFTS, Balancing.

Engines. See AUTOMOBILE ENGINES, Balancing.

Large Rotating Apparatus. Balancing Large Rotating Apparatus, I. C. Fletcher. Elec. Jl., vol. 21, no. 1, Jan. 1924, pp. 5-10, 5 figs. Describes modern design of balancing machine and method of balancing.

Rotating Masses. See INTERNAL-COMBUSTION ENGINES, Balancing of Masses.

Turbine Rotors. Balancing L. P. Turbine Rotor on Board U. S. S. Detroit, H. C. Dinger. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 4, Nov. 1924, pp. 648-654, 2 figs. Gives example showing possibilities to which balancing machines of Akimoff type may be put.

See also MARINE STEAM TURBINES, Balancing Rotors.

BALANCING MACHINES

Dynamic. A New Balancing Apparatus (Ein neuer Auswuchtapparat), F. Punga. Elektrotechnische Zeit., vol. 45, no. 27, July 3, 1924, pp. 713-714, 5 figs. Describes new apparatus for balancing rapidly rotating bodies in which weight wanting is determined without stopping.

Balancing of Rotating Masses (Das Auswuchten Umlaufender Massen), M. Krause. Praktische Maschinen-Konstrukteur, vol. 57, no. 17, May 13, 1924, pp. 229-232, 20 figs. Shows that static balancing of machine parts is by no means adequate; describes machine which enables correct dynamic balancing.

Lawaczeck-Heymann. Balancing Machines (Gross-Auswuchtmaschinen), E. Lehr. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1025-1028, 6 figs. Describes operation of machine built on basis of many years' shop experience and giving entire satisfaction.

Odén-Keen. An Automatic and Continuous Recording Balance (The Odén-Keen Balance.), J. R. H. Coutts, E. M. Crowther, B. A. Keen, and S. Odén. Roy. Soc.—Proc., vol. 106, no. A735, July 1, 1924, pp. 33-51, 11 figs. Describes improved form of automatic self-recording balance in which control is effected electromagnetically with no loss of sensitivity up to maximum load balance is designed to carry.

BALL BEARINGS. See BEARINGS, BALL.

BALLOONS

Atmospheric Electricity and. The Free Balloon and Atmospheric Electricity (Le ballon libre et l'électricité atmospherique), A. Baldit. Nature, nos. 2635, 2636, and 2637, Oct. 4, 11, and 18, 1924, pp. 209-213, 225-228, and 241-246, 14 figs. Discusses decreasing electric field with altitude, cloud electrification, conducting and non-conducting spheres in a uniform electric field, fogs and clouds in electric field, balloon in a storm, etc.

Manila Rope for. Development of Manila Balloon Rope. U. S. Air Service Information Circular, vol. 1, no. 41 (Addendum), Mar. 1, 1924, 2 pp. Test results show effect of continuous weathering on three types of rope, namely, Italian, standard manila bolt, and special loose-lay manila.

BALLS

Hardness. See HARDNESS, Steel Balls, Magnetic Test.

Hollow Seamless, Manufacture. Hollow Seamless Balls, F. D. Jones. Machy (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 255-260, 10 figs. How seamless balls are made from single piece of metal; rolling operation, which follows press work, is important step in process, patented by Hollow Ball Co., Baltimore, and developed to insure accuracy of form and balance, combined with lightness and strength. See also description in Iron Age, vol. 114, no. 24, Dec. 11, 1924, pp. 1544-1545, 5 figs.; and description, by F. Dantzig, in Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 877-880, 6 figs.

Steel, Manufacture. See HARDNESS, Brinell Ball Testing Method; JOINTS, Balls and Sockets for, Machinery.

BALSA WOOD

Use of. See AIRCRAFT CONSTRUCTION MATERIALS, Plywood.

BANKS

Vaults, Heating. See HEATING AND VENTILATION, Bank Vaults.

BARGES

Channel-Steel Construction. Build Barges of Steel Channels. Iron Trade Rev., vol. 74, no. 11, Mar. 13, 1924, pp. 736-737, 4 figs. New method of construction employing ordinary channels bolted together; gaskets are applied between flanges to make hull watertight; great strength is claimed.

Derrick. The Government Derrick Boat "Monallo." Pit & Quarry, vol. 8, no. 11, Aug. 1924, pp. 93-96, 3 figs. U. S. Gov. operates 50-ton derrick boat on Monongahela and Ohio Rivers in construction work handling heavy steel in connection with locks and dams, and handling 5 cu. yd. bucket dredging and in filling coffer dams full-circle revolving type designed for dredging, lifting, and pile driving.

BARK

Fuel. See FUELS, Pulpwood Bark.

BAROMETERS

Standard. A Standard Barometer of New Design, T. H. Laby. Jl. Sci. Instruments, vol. 1, no. 11, Aug. 1924, pp. 342-345, 1 fig. Describes barometer in which distance between mercury surfaces is measured by means of equivalent of 30-in. steel screw micrometer; design eliminates cathetometer commonly used with such instruments, and difficulties and errors of reading mercury surfaces enclosed in glass tubes.

BARRAGES. See DAMS.

BARRELS. See CASKS.

BARYTES

Canada. Barytes Situation in Canada (1923). Can. Min. Jl., vol. 45, no. 46, Nov. 14, 1924, pp. 1119-1120. Data on sources, mining, uses, production, imports and exports, and Canadian and United States tariff.

Canada's Barytes Resources, H. S. Spence. Can. Min. Jl., vol. 45, no. 46, Nov. 14, 1924, pp. 1116-1118, 2 figs. Distribution of deposits, review of mining operations, prospects for establishing a barytes mining industry, and conditions of success.

BATTERIES

Primary. An Efficient Primary Cell. Engineer, vol. 137, no. 3571, June 6, 1924, pp. 636-637, 6 figs. New cell, which is invention of Belgian engineer, L. Darimont, is of two-fluid type.

Modern Primary Batteries, H. Ward and L. D. Goldsmith. World Power (formerly Beama), vol. 1, no. 1, Jan. 1924, pp. 35-41. Account of functioning and construction of present-day batteries.

The Nyberg Primary Cell (Das Nyberg-Element), H. D. Nyberg. Zeit. für Elektrochemie, vol. 30, no. 11, Nov. 1924, pp. 549-552, 1 fig. Cell consists of heavily amalgamated zinc cathode and anode of porous carbon impregnated with paraffin wax, immersed in 10-per cent solution of caustic soda; to protect latter, container is fitted with air-tight cover with provision for intake of air; initial electromotive force is 1.18 volts; dry cell may be constructed with aid of cellulosic absorbents.

Storage. See STORAGE BATTERIES.

Weston Standard Cells. Portable Unsaturated Weston Cells, W. C. Vosburgh and M. Eppley. Optical Soc. America & Rev. Sci. Instruments—Jl., vol. 9, no. 1, July 1924, pp. 65-74, 2 figs. Discusses construction, hysterisis, effect of acidity of electrolyte and of grain size of mercury sulphate, temperature coefficients, etc.

The Effect of Various Preparations of Mercurous Sulfate on the Electromotive Force and Hysterisis of Weston Standard Cells, W. C. Vosburgh and Marion Eppley. Am. Chem. Soc.—Jl., vol. 46, no. 1, Jan. 1924, pp. 104-111. Weston standard cells made with finely divided mercurous sulphate had electromotive forces 40 to 100 mv. higher than cells made with coarser mercurous sulphate; addition of acid to cells lowered hysterisis considerably.

BATTLESHIPS. See WARSHIPS.

BAUXITE

British Columbia. Discovery of Bauxite in B. C. R. Dunn. Can. Min. Jl., vol. 44, no. 48, Nov. 30, 1923, pp. 947-948. Deposits located near Stony and Demaniel Creeks, Sooke District of Vancouver Island, reported on by government mining engineer.

German. Bauxite Deposits, (Aluminium-Lagerstätten), H. Harrassowitz. Metal u. Erz., vol. 21, no. 14, July 2, 1924, pp. 325-328. Details of principal deposits, especially bauxites, kaolin, German resources, etc.

Mississippi. The Bauxite Deposits of Mississippi, P. F. Morse. Miss. State Geol. Surv., Bul. No. 19, Dec. 1923, 208 pp., 13 figs. partly on supp. plates. Bauxite deposits of Europe, South America, Asia, Africa, and Australia; bauxite deposits of United States exclusive of Mississippi; study of bauxite deposits of Mississippi, discussing physiography, stratigraphy, geographic and geologic distribution; technology of bauxite; methods of chemical analysis.

Occurrence and Supply. Occurrence and Supply of Bauxite, E. C. Eckel. Cement, Mill & Quarry, vol. 24, no. 12, June 20, 1924, pp. 23-25. A hydrated oxide of aluminum. Composition and impurities of bauxite; use as a cement material.

Petroleum Refining Agent, Use as. Bauxite as a Refining Agent for Petroleum Distillation, A. E. Dunstan, F. B. Those and F. G. P. Remfry. Chem. & Industry, vol. 43, no. 24, June 13, 1924, pp. 179T-188T, 2 figs. Experimental verification of Freundlich law as applied to adsorption of sulphur and color compounds from kerosene by bauxite; bauxite as polymerizing agent; influence of liquids other than kerosene on ergometer reading; filters and filtration; furnacing. See also following article, by A. M. Brien, on Technical Use of Bauxite in Connection with Petroleum Refining, pp. 188T-189T.

See also OIL, Refining.

Prospecting, Dutch Guiana. Prospecting for Bauxite in Dutch Guiana, L. T. Emory. Eng. & Min. Jl.-Press, vol. 118, no. 2, July 12, 1924, pp. 45-48, 7 figs. Describes peculiar features of the work. Bauxite is hydrated oxide of aluminum, containing certain impurities, iron, silica, and titanium in varying amounts.

Purification. The Purification of Bauxite, W. A. C. Newman. Chem. Age (Lond.), vol. 10, no. 260, June 7, 1924, pp. 42-43. Bayre, Peniakoff, Serpek, and Deville-Pechiney or dry soda processes.

BEACHES

Coney Island, N. Y., Improvements. Coney Island Public Beach and Boardwalk Improvement. Mun. Engrs. Jl., vol. 9, 4th Quarterly Issue, 1923, pp. 136.1-136.24 and (discussion) 136.25-136.32, 8 figs. Description of improvement which consisted of construction of an elevated highway, or boardwalk, making of a public bathing beach exterior to walk, construction of a bulkhead several thousand feet in length along interior line of beach, and of a series of groynes and jetties for protection of new beach and adjacent upland, including methods used.

Erosion. Beach Erosion: Its Causes and Cure, H. C. Ripley. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 1, Jan. 1924, pp. 13-18, 1 fig. and (discussion), nos. 4 and 5, Apr. and May, 1924, pp. 529-542 and 657-659, 2 figs. Explains principal causes of beach erosion and accretion and determines principles which control these actions; gives two examples, one in France and other in Brazil, where works have been constructed that illustrate principles enunciated and confirm conclusion reached.

Esplanade, San Francisco. Ocean Beach Esplanade, San Francisco, California, Am. Soc. Civ. Engrs.—Proc., vol. 50, nos. 3 and 5, Mar. and May 1924, pp. 351-372 and 651-656, 22 figs. Discussion by M. Haupt on paper by M. M. O'Shaughnessy.

BEAMS

Airplane. See AIRPLANES, Beams.

Bending and Shearing Stress. Bending and Shear in Straight Beams (Biegung und Schub in geraden Balken), C. Weber. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 4, Aug. 1924, pp. 334-348, 32 figs. Thorough investigation of bending of beams disregarding the usual assumption that cross sections remain even; deals with bending through transverse force, main and additional shearing stresses, etc.

Buckling of, Lateral. Beams without Lateral Support, S. Timoshenko. Am. Soc. Civil Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 239-254, 4 figs. Considers sidewise buckling of I-beams under different loadings and differing kinds of end fastenings; calculation of critical values of maximum stresses, with tabulated results; by use of these tables, necessary reduction in working stresses can be easily calculated; general method used in solution of problem; method of calculating critical loads beyond elastic limit; calculations show that actual safety of I-beams is less than that indicated by approximate formulas now in use.

Calculation. Combined Flexure and Direct Stress. Ferro-Concrete, vol. 16, nos. 4 and 6, Oct. and Dec. 1924, pp. 79-82 and 135-138, 2 figs. Trigonometric method of calculation proposed by Prof. H. Spangenberg, of Higher Technical School of Munich, applicable as well to case of tension as to that of compression in combination with flexure.

The Calculation of Beams Fixed at Both Ends, with Special Regard to Longitudinal Strength (Zur Berechnung des beiderseits eingemauerten Trägers unter besonderer Berücksichtigung der Längskraft), F. Takabeya. Kyushu Imperial University, College of Eng.—Memoirs, vol. 2, no. 7, 1922, pp. 277-326, 28 figs. and supp. tables. Development of general equations.

Concrete. See FLOORS, Concrete Beams as Ceiling.

Continuous. Calculation of Rigid Continuous Beams with Joints and Loaded Axilly (Il calcolo della trave continua con cerniere, inflessa e sollecitata assialmente), M. Castoldi. Ingegneria, vol. 3, no. 7, July 1, 1924, pp. 235-236, 5 figs. Discusses Albenga equations of three moments, insertion of joints to get better distribution of flexion, and eliminates influence of central deformation of beam (airplanes).

Graphical Method of Solving Continuous Beams, F. W. Davey. Concrete & Constr. Eng., vol. 19, no. 12, Dec. 1924, pp. 751-754, 3 figs. Discusses Claxton Fidler's method of "characteristic points."

Moments in Continuous Beams Having a Varying Moment of Inertia, Chas. S. Gray. Concrete & Constr. Eng., vol. 19, no. 10, Oct. 1924, pp. 621-626, 3 figs. Author uses graphical solution of question.

Moments in Two-Span Continuous Beams With Various Span Ratios, C. S. Gray. Concrete & Constructional Eng., vol. 19, no. 2, Feb. 1924, pp. 91-99, 4 figs. Gives values of bending moments at support and in both spans for all cases of uniformly distributed loading where ratio of spans varies from 1:1 to 1:0.1.

Solving Elasticity Equations of Five Members and Their Relation to Continuous Beams on Elastically Depressible Supports (Die Auflösung fünfgliedriger Elastizitätsgleichungen und ihre Beziehungen zum durchlaufenden Träger auf elastisch senkbaren Stützen), G. Kapsch. Zeit. für Bauwesen, vol. 74, nos. 4-6 and 7-9, 1924, pp. 47-58 and 80-86, 17 figs. Discusses method of solving equations of many members, based on Gauss' method of elimination, and gives examples. Practical application in calculation of continuous beams.

Tables for Calculating Beam Over Three Unequal Openings (Hilfstafeln zur Berechnung des Balkens über drei ungleichen Oeffnungen), E. Kammer. Beton u. Eison, vol. 23, nos. 16 and 17, Aug. 20 and Sept. 5, 1924, pp. 219-223 and 233-235, 7 figs. Discusses influence lines of static values for determination of cross section; maximum and minimum values of moments and shearing forces; table of ordinates of influence lines of beams; numerical examples.

Curved. The Bending Moments of Parabolically Curved Beams (Die Biegungsmomente parabolisch gekrümmter Träger), A. Troche. Beton u. Eisen, vol. 23, no. 5, Mar. 5, 1924, pp. 50-52, 3 figs. It is shown that axial bending moments in cross-sections of such beams are independent of rise of arch (when influence of normal and transverse forces are disregarded), so that lines of influence of moments as well as their maximum, minimum, and surface value curves can be analytically determined irrespective of rise of arch.

Tipping Load of Curved Beams (Ueber die Kipplast krummer Stäbe), K. Federhofer. Bautechnik, vol. 2, no. 26, June 17, 1924, pp. 306-312, 13 figs. Mathematical discussion showing how to arrive at tipping load by using graphic integration methods starting from general formulas for tipping curved beams.

Deflection. Calculating Deflections of Beams By a Simple Method, P. G. Laurson. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 424-425, 1 fig. Describes method for computing deflection at any point of a beam resting on two supports or of a cantilever beam, requiring no calculus. Procedure based on Fraenkel's formula. Summation of products of two moments along beam gives deflection.

Elastic Line, Determination of. Graphic Determination of the Elastic Line of an Elastically Supported, Statically Indeterminate Beam (Zeichnerische Ermittlung der elastischen Linie eines federnd gestützten, statisch unbestimmten Balkens), C. B. Biezeno. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 93-102, 4 figs. Simple iteration method for determining reaction of support of such beams.

Girders. See GIRDERS.

I-Beams. Curving of Cross-Section in I Beams (Die Querschnittswölbung im Verdrillten I-Träger), KK. Huber. Bauingenieur, vol. 5, no. 13, July 15, 1924, pp. 394-397, 3 figs. Discusses torsional loading, and bending of cross-sections by special law; gives results of experiments.

Torsional Strength of Steel I-Sections, C. R. Young and C. A. Hughes. Can. Engr., vol. 46, no. 24, June 10, 1924, pp. 593-597, 5 figs. Working formula established for maximum torsional shearing stress. Critical stress generally in flange. Effective polar moment of inertia of standard I-beams from 5.2 to 14.8 per cent of tabular polar moment of inertia.

Impact and Internal Damping. Influence of Internal Damping on Resistance to Impact (Einfluss der inneren Dämpfung auf die Festigkeit gegenüber Stössen), Th. P. Lesch. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 124-142, 2 figs. Investigation of beams to determine modifying influence of internal damping on impact.

Impact on. Effect of Impact of Falling Bodies on Simple Beams (Beitrag zur Beurteilung der Stosswirkung herabfallender Körper auf einfache Balken), W. Kaufmann. Bauingenieur, vol. 5, nos. 16 and 17, Aug. 31 and Sept. 15, 1924, pp. 498-502 and 545-546. Discusses methods for reducing dynamic problem to a static problem, and develops equations for calculating impact.

Influence-Line Diagrams. Influence Line Diagrams for Shearing Force, Bending Moment, Slope, and Deflection for Single-Span Girders, W. N. Thomas. Concrete & Constr. Eng., vol. 19, nos. 11, Nov. 1924, pp. 687-696, 8 figs. Shows how influence lines may be derived in case of simple beam, simply supported at its two ends, fixed, fixed at one end and supported at other, and fixed at one end and unsupported at other.

Influence Lines. Influence Lines (Lignes d'Influence), P. J. Rullens. Assn. des Ingénieurs sortis de l'École Polytechnique de Bruxelles—Bul. Technique, vol. 19, nos. 4 and 5, 1923, and vol. 20, no. 1, 1924, pp. 117-170, 179-196, and 6-38, 63 figs. partly on supp. plates. Detailed study of this method of calculation, as follows: Part I: Influence lines in statically determinate systems. Part II: Influence lines in statically indeterminate systems. Part III: Applications, Bascule bridges, Vierendeel beams. Part IV: Fixed beams, bridges, etc.

Rectangular Beam and Column System. Study of the Continuity in a Rectangular System of Beams and Columns (Etude de la continuité dans un réseau rectangulaire de poutres et de piliers), H. Bordier. Génie Civil, vol. 84, no. 11, Mar. 15, 1924, pp. 248-254, 22 figs. Purpose of study is to show that in a framework of beams and columns, moments on support of loaded trestle can be calculated with the same formulas as those in continuous beams.

Reinforced-Concrete. Chart for Designing Beams in Compression or Tension, E. M. Roydes-Jones. Concrete & Constructional Eng., vol. 19, no. 2, Feb. 1924, pp. 83-85. Gives chart, expressing graphically results of calculations by writer, which will be found very useful in designing beams or slabs subjected to compression or tension as well as bending moment.

Dimensioning of Rectangular Reinforced-Concrete Profiles Under Bending Moment, Compression or Tensile Load. Single and Double Reinforcement (Bemessung von rechteckigen eisenbetonquerschnitten, beansprucht durch biegungsmomente und Druck- oder Zugkräfte. Einfache und Doppelbewehrung), M. Janser. Bauingenieur, vol. 5, nos. 13 and 14, July 15 and 31, 1924, pp. 411-413 and 435-438, 12 figs. Details of very simple and accurate method, resulting often in considerable saving of iron.

Electric-Cement Concrete and Shearing Force in Reinforced Concrete (Le béton au ciment électro-fondu et l'effort tranchant en béton armé), G. Magnel. Assn. des Ingénieurs sortis des Écoles Spéciales de Gand—Annales, vol. 14, series 5, 1924, pp. 183-198, 9 figs. Discusses electric-cement concrete, its resistance to compression and to traction; results of experiments with Portland cement and alumina cement beams with and without reinforcement.

Further Experiments and Construction Work with High Class Portland Cement (Weitere Versüche und praktische Bauausführungen mit hochwertigem Portlandzement), G. Rüth. Beton u.

Eison, vol. 23, no. 16, Aug. 20, 1924, pp. 213-217, 8 figs. Tests of concrete beams, etc., 250 kg. cement (Dyckerhoff Doppel) to 1 cu. m. gravel sand or 1:5.5 in volume; measurement of shrinkage, etc.

Reinforced-Concrete Beams With Double Reinforcement (Travi di cemento armato con doppia armatura), E. Lo Cigno. Rivista Tecnica delle Ferrovie Italiane, vol. 26, no. 4, Oct. 15, 1924, pp. 109-121, 9 figs. partly on supp. plates. Discusses more convenient distribution of irons in case of bending, compression, and eccentric loads in rectangular beams, and makes calculations.

Shearing Strength of Reinforced Concrete Beams Under Bending Load (Schubfestigkeit in Eisenbetonbalken, welche auf Biegung beansprucht sind), O. Hausen. Beton u. Eisen, vol. 23, nos. 18 and 19, Sept. 20 and Oct. 5, 1924, pp. 243-247 and 256-258, 21 figs. Discusses distribution of shearing forces over concrete and reinforcement and makes calculations.

Stresses in a Rectangular Reinforced-Concrete Cross Section due to Bending Axis Oblique to Sides of Rectangle (Die Spannungen im rechteckigen Eisenbetonquerschnitt infolge einer schräg zu dep rechteckseiten liegenden Biegungsachse), M. Preuss. Bauingenieur, vol. 5, no. 14, July 31, 1924, pp. 427-429, 4 figs. Discusses quadratic or cubic equations of sufficient approximation, direction of zero line of angle B being precalculated.

Stresses in T-Beams With Compression Steel, J. Rieger. Concrete & Constructional Eng., vol. 19, no. 3, Mar. 1924, pp. 181-187, 5 figs. Gives a logarithmic slide rule for calculating reinforced-concrete structures, and explains its use.

Statically Indeterminate Systems. The Determination of Statically Indeterminate Systems through Measurement (Beitrag zur Lösung statisch unbestimmter Systeme durch Messung), F. Kann. Beton u. Eisen, vol. 23, no. 20, Oct. 20, 1924, pp. 268-273, 23 figs. Investigation to determine excess number of statically indeterminate systems through measurement of deflections on cardboard models.

Wooden. Tests With Wooden Beams According to the Hetzer Method (Versuche mit Holzbalken nach Bauweise Hetzer), F. Hübner. Schweizerische Bauzeitung, vol. 84, nos. 5 and 6, Aug. 2 and 9, 1924, pp. 51-55 and 65-67, 10 figs. Details of tests of beams for construction by Hetzer method in connection with official bureau for testing materials, showing satisfactory results.

See also AIRPLANES, Beams.

BEARING METALS

Anti-Friction. Anti-Friction Bearing Metals, P. W. Priestley. Automobile Engr., vol. 14, no. 192, Aug. 1924, pp. 225-230, 2 figs. Considers chemical, thermal, and physical characteristics of tin-base alloys.

Characteristics. Bearings and Characteristics of Bearing Metals, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 3, Mar. 1924, pp. 106-108. Composition and characteristics of different bearing metals; hints on proper procedure in babbitting bearings; points to be considered in selecting a bearing metal.

Durex. Durex, a Bearing Material Which Holds Oil Like a Sponge. Automotive Industries, vol. 50, no. 20, May 15, 1924, pp. 1072-1074, 14 figs. Copper-tin-graphite bronze which absorbs up to one-fourth its own volume by capillarity through myriads of tiny, evenly distributed pores, and maintains oily bushing surface; offers insurance against shortage or stoppage of lubrication.

Gun Metal. See GUN METAL.

Hardness. Rate of Cooling Determines Hardness of Alloy. Automotive Industries, vol. 50, no. 13, Mar. 27, 1924, p. 723. Results of researches into structure of ternary bearing-metal alloys by Dr. L. Kaul; it is shown that rate of cooling rather than pouring temperature determines hardness of alloy.

Rapid Analysis. Method for the Rapid Analysis of Bearing Metals (Eine analytische Schnellmethode für Lagermetalle), A. Bartsch. Chemiker-Zeitung, vol. 48, no. 99, Aug. 16, 1924, p. 577. Determination of antimony and tin; filtrate from copper is titrated with ferrocyanide for zinc, using acetic-acid solution of iron alum as external indicator.

Testing. See LUBRICATING OILS, Investigating Method.

Thermit. Thermit, the Universal Bearing Metal (Das Universal-Lagermetall "Thermit"), G. v. Hanffstengel. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1075-1076, 2 figs. A bearing metal containing besides lead, tin, antimony, copper, some nickel and other ingredients for hardening, with lower solidification point at 245 deg. Treatment and uses.

BEARINGS

Anti-Friction. Advanced Practice in Anti-Friction Bearings, P. B. Liebermann. Am. Mach., vol. 60, no. 15, Apr. 10, 1924, pp. 533-534. Anti-friction favored over plain bearings in most cases; data on two important conveyor installations; application to electric motors; desirability of making comparative tests in laboratory. (Abstract.)

Anti-Friction Bearings Lower Transportation Costs from Face to Railroad Car, F. H. Kneeland. Coal Age, vol. 25, no. 17, Apr. 24, 1924, pp. 603-606, 5 figs. Need only one-fourth as many applications of lubricant as plain bearings and have nearly twice as long life; lubrication cost reduced by two-thirds; save power and equipment.

Journal Boxes with Anti-Friction Bearings, O. R. Wikander. Ry. Mech. Engr., vol. 98, no. 1, Jan., 1924, pp. 33-35, 3 figs. Discusses possible standardization of ball and roller bearings for railway cars.

Operating Characteristics of Anti-Friction Bearings. Wood Worker, vol. 43, no. 8, Oct., 1924, pp. 57-59. Discusses friction, reliability, lubrication, precision, thrust loads, and proportions.

The Application of Anti-friction Bearings, Fred G. Whipp. Machy. (Lond.), vol. 25, no. 637, Dec. 11, 1924, pp. 329-336, 14 figs. Applications to factory transporting and haulage gear.

Automobile Axles. The Friction Losses in Journal and Roller Bearings in Automobile Axles (Die Reibungsverluste der Gleitlager und der Rollenlager bei Automobilachsen), G. Becker. Motorwagen, vol. 27, no. 12, Apr. 30, 1924, pp. 201-206, 10 figs. Report of Experimental Station for Automotive Vehicles of Tech. High School, Berlin-Charlottenburg.

Babbitted. Tests Show Breakdown Pressure of Oil Films in Babbitt Bearings, L. N. Linsley, Automotive Industries, vol. 51, no. 26, Dec. 25, 1924, pp. 1084-1085, 2 figs. Results of experimental work carried out at Johns Hopkins University show that limiting bearing load in pounds per square inch of projected bearing surface increases with cricumferential speed of journal and with viscosity of lubricant; effect of adding oleic acid. (Abstract.) Paper read before Am. Soc. Mech. Engrs.

Babbitting. Pointers in the Casting of Babbitt Bearings, J. V. Romig. Can. Machy., vol. 31, no. 1, Jan. 3, 1924, p. 34, 4 figs. Metal must be well stirred and hot enough to ignite a dry pine sliver; white lead or smoke on shaft provides necessary clearance. See also Can. Foundryman, vol. 15, no. 1, Jan. 1924, p. 19, 4 figs.

Ball. See BEARINGS, BALL.

Brasses, Babbitting. Babbitting Brasses for Subway Trains, F. H. Colvin. Am. Mach., vol. 60, no. 17, Apr. 24, 1924, pp. 629-630, 4 figs. Methods and equipment in babbitting room of New York 148th St. shop; simple mandrels used for holding brasses in position for babbitting; two men handle four tons of babbit per month.

Cylindrical. The Design and Performance of Complete Cylindrical Bearings From Mathematical Theory of Lubrication, G. B. Upton. Sibley Jl. of Eng., vol. 38, nos. 3 and 4, Mar. and Apr. 1924, pp. 56-60 and 76, and 97-100, 6 figs. Presentation and discussion of Harrison's equations; and modifications brought about by finite length and its consequences in end leakage of lubricant and lengthwise variation of pressure in lubricating film.

Experiments. Some Bearing Investigations, E. G. Gilson. Gen Elec. Rev., vol. 27, no. 5, May 1924, pp. 318-327, 20 figs. Results of investigation made by Research Laboratory of Gen. Elec. Co. into phenomena of bearings.

Friction in. Coefficient of Friction of Bearing Pins (Wie kommt es dass die Reibungszahl eines Walzlagers so gering ist), H. Stellrecht. Praktische Maschinen-Konstrukteur, vol. 57, no. 41, Oct. 28, 1924, pp. 555-556. Discusses friction in bearings generally and in ball bearings particularly. Shows that if ball impressions keep within limit of elasticity, balls will never be injured.

Journal. Survey of Armature, Axle and Journal Bearings Practice. Elec. Ry. Jl., vol. 64, nos. 7 and 17, Aug. 16 and Oct. 25, 1924, pp. 227-235 and 725-729, 25 figs. Analysis of types of bearings favored, methods of determining wear and removal of bearings, removing old babbitt, cleaning and tinning shells; practices of 20 electric railways. Oct. 25: Methods employed for machining bearings, cutting oil grooves, and other work necessary to produce finished bearing.

See also Michell Journal.

Journal, Pad System Applied to. The Pad Systen Applied to Journal Bearings, Johnstone-Taylor. Am. Mach., vol. 60, no. 1, Jan. 3, 1924, pp. 9-10, 4 figs. Also Mar. Eng. & Shipping Age, vol. 29, no. 8, Aug. 1924, pp. 476-478, 5 figs. Design of bearings constructed on pad system and their advantages.

Locomotive. Lining of Locomotive Bearings With Lead Alloy, Hardened by the Addition of Calcium (Das Ausgiessen von Lokomotivlagern mit den durch Zusatz von Erdkali-Metallen gehärteten Bleilegierungen Calcium und Lurgi, H. Münter. Glasers Annalen, vol. 95, no. 7, Oct. 1, 1924, pp. 155-159, 16 figs. Discusses the various advantages of hardened lead alloy for lining of locomotive bearings, as compared to tin alloys, and describes necessary equipment for carrying out of process.

Lubrication. Achieving Safety in Lubrication, R. W. A. Brewer. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 857-859, 6 figs. Fundamental principles which underlie art of correct lubrication; results of tests; fatty acids prevent seizure of heavily loaded bearings; normal working friction more important than abnormal conditions.

Some Types of Applications of Babbitt, Ball and Roller Hanger Bearings, F. E. Gooding. Indus. Engr., vol. 82, no. 5, May 1924, pp. 229-231 and 257, 9 figs. Methods of lubricating bearing surfaces and reducing friction losses.

The Mechanism of Lubrication, D. P. Barnard, H. M. Myers and H. O. Forrest. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 347-350, 8 figs. Effect of oiliness on behavior of journal bearings.

The Proper Lubrication of Modern Industrial Bearings, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 177-183, 9 figs. Discusses characteristics and requirements of each type of bearing.

See also LUBRICATION, Journals.

Machining. See MACHINING METHODS, Bearings.

Michell Journal. Notes on the Michell Journal Bearing. Machy. (Lond.), vol. 25, no. 638, Dec. 18, 1924, pp. 371-376, 7 figs. From data presented it is quite clear that there is most marked economy in use of Michell journal bearing so far as frictional losses are concerned.

Motor. Economies in Selection of Motor Bearings, A. C. Turtle. Ry. Elec. Eng., vol. 15, no. 3, Mar. 1924, pp. 88-91, 5 figs. Consideration of advantages of oil ring bearings and ball bearings; oiling considerations.

See also Sleeve.

Oil-Engine. White Metal Bearings for Oil Engines, F. J. Taylor, Gas & Oil Power, vol. 19, no. 225, June 5, 1924, pp. 155-156, 2 figs. Causes and prevention of engine-shaft failure.

Oil Ring. See Motor.

Paper-Mill Machinery. The Most Efficient Type of Bearing for Paper Machinery, G. H. Spencer. Paper Mill, vol. 48, no. 15, Apr. 12, 1924, pp. 65-66, 68, 70 and 72f, 13 figs. Construction of plain babbitt bearing; functions and operations on paper machines of anti-friction bearing.

Railway-Motor, Lubrication of. Packing Railway Motor Bearings for Oil Lubrication, C. Bethel. Elec. Ry. Jl., vol. 63, no. 16, Apr. 19, 1924, pp. 605-609, 13 figs. Method of packing bearings; wood waste is most satisfactory, but care must be used to insure feeding proper quantity of oil; essentials are to keep shell tight and clearance small; proper designs of oil grooves necessary.

Roller. See BEARINGS, ROLLER.

Sleeve. Sleeve Bearing Keeps Oil From Spattering Motor, R. Pruger. Coal Age, vol. 25, no. 26, June 26, 1924, pp. 945-947, 4 figs. Describes "sealed-sleeve" bearing which excludes dirt and prevents oil leakage.

Some Ways to Cure Sleeve Bearing Troubles, R. Pruger. Indus. Engr., vol. 82, no. 3, Mar. 1924, pp. 113-117, 10 figs. Design and construction of motor sleeve bearings, their advantages, and improvements which have been made to overcome troubles that are sometimes encountered.

Steam-Turbine, Re-Metalled, Boring of. Boring Re-Metalled Bearings of Turbines and Gear Cases. Mar. Engr., vol. 47, no. 559, Apr. 1924, pp. 137, 138, 2 figs. Outlines proposed method for more accurate boring after re-metalling of journal bearings of high-speed turbines.

Tests. Bearing Tests (Lagerversuche), G. Meyer-Jagenberg. Werkstattstechnik, vol. 18, no. 3, Feb. 1, 1924, pp. 41-46, 27 figs. Gives proof of agreement between test results and theory; numerical dependence of bearing friction on working conditions; determination of most suitable oil and calculation of friction corresponding to given working conditions.

Tests on Bearings (Lagerversuche), G. Meyer-Jagenberg. Werkstattstechnik, vol. 18, nos. 7 and 8, Apr. 1 and 15, 1924, pp. 214-217, and 229-236, 23 figs, Apr. 1: Investigation of two kinds of ball bearings; influence of load, speed, and lubrication on friction conditions; importance of felt packing of ball-bearing housings. Apr. 15: Investigations of same bearings as transmission bearings; comparison of test-bed and transmission results; comparison of journal and ball-bearing transmission.

Thrust. See BEARINGS, THRUST.

Use and Maintenance. Possible Improvements in Bearing Service, G. A. Van Brunt. Indus.

Engr., vol. 82, no. 6, June 1924, pp. 264-270 and 304, 11 figs. Manufacturers of sleeve, ball, and roller bearings give their viewpoint on things to be considered in connection with use and maintenance of bearings.

Waste-Packed. Waste-Packed Bearing Design and Operation, C. Bethel. Elec. Jl., vol. 21, no. 3, Mar. 1924, pp. 115-118, 4 figs. Information regarding oil flow and action of waste packing.

BEARINGS, BALL

Automobile. How and Why Ball Bearings are Used on Car and Truck Crankshafts, P. M. Heldt. Automotive Industries, vol. 51, no. 6, Aug. 7, 1924, pp. 282-285, 9 figs. Discusses application and advantages of ball bearing and describes number of cars and trucks using them for crankshafts.

Making Ball Bearings for Automobiles, H. R. Simonds. Iron Trade Rev., vol. 74, no. 5, Jan. 31, 1924, pp. 345-349, 9 figs. Describes manufacture of radial bearings at Chicago plant of U. S. Ball Bearing Mfg. Co.

Precision Ball Bearings (Erzeungnisse der Schweinfurter Präzisions-Kugellager-Werke Fichtel & Sachs A.-G.). Automobil-Rundschau, vol. 23, no. 5, May 1924, pp. 56-59, 11 figs. Types of precision ball bearings made by firm of Fichtel & Sachs Corpn. for automobile and motorcycle construction.

Calculation of. Formulas for and Properties of Ball and Roller Bearings (Alcune formole e proprieta notevoli nella cinematica dei cuscinetti portanti a sfere e a rulli), S. R. Treves. Industria, vol. 38, no. 9, May 15, 1924, pp. 242-245, 5 figs. Formulas for calculating peripheral speed, coefficient of resistance, etc.

Development. Development of Rolling Bearings (Die Entwicklung der Wälzlager), Hönicke. Praktische Maschinen-Konstrukteur, vol. 57, nos. 25 and 27, July 8 and 22, 1924, pp. 357-358 and 386, 7 figs. Design and development of ball and roller bearings made by Berlin-Karlsruher Industrie Werke A. G.

Electrical Machinery. Selection of Ball and Roller Bearings for Electrical Machines, T. D. Trees. Instn. Elec. Engrs.—Jl., vol. 62, no. 333, Sept. 1924, pp. 782-790, 6 figs. Lines on which selection of bearings should proceed. Observations of a general character regarding capacities, costs, types, etc. Bibliography.

Friction in. See BEARINGS, Friction in.

Heat Treatment. Heat Treatment of Ball and Roller Bearings, Jos. K. Wood. Am. Mach., vol. 61, no. 24, Dec. 11, 1924, pp. 929-931. Required properties of materials for ball bearings; chrome steel for bearings and its heat treatment; manufacturing processes; shortcomings of stainless steel.

Housings. Design of Ball Bearing Closures, T. C. Delaval-Crow. Am. Mach., vol. 60, no. 13, Mar. 27, 1924, pp. 453-457, 39 figs. Description of a variety of ball-bearing housing arrangements to prevent leakage of lubricant and entrance of foreign matter.

Life. **The Life of Ball Bearings (Die Lebensdauer von Kugellagern, A. Palmgren. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 14, Apr. 5, 1924, pp. 339-341. Shows that life of ball bearings subjected to axial or combined stresses depends partly on maximum developed ball pressure and partly on fatigue phenomena which have changed in comparison to conditions with purely radial load.**

Loads. **Ball-bearing Loads. Machy. (Lond.), vol. 23, no. 597, Mar. 6, 1924, pp. 788-789, 8 figs.** Details of new formula for determining ball-bearing loads in pamphlet issued by Tormo Mfg. Co., London; no actual formula is given, necessary data beng supplied by three charts.

Machine Tools. **Application of Ball Bearings to Machine Tools. Machy. (N. Y.), vol. 30, no. 10, June, 1924, pp. 776-781, 9 figs.; also Machy. (Lond.), vol. 24, no. 609, May 29, 1924, pp. 257-262, 9 figs.** Method of applying ball bearings to **lathes, grinding machines, drilled-machine spindles, and transmission shafts.**

Application of Ball Bearings to Machine Tools, B. M. W. Hanson. Machy. (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 355-361, 15 figs. Thread-milling machine spindle equipped with ball bearings; ball-bearing bevel-gear transmission, vertical milling machine grinder spindles, lathe centers, lineshaft hangers, etc.; roller bearings for heavy duty.

Manufacture. The Production of Ball Bearings. Eng. Production, vol. 7, no. 147, Dec. 1924, pp. 357-363, 8 figs. Methods and organization of Shefko Co.

See also Automobile.

Mine-Locomotive Motors. **The Use of Ball Bearings on Mine Locomotive Motors, C. A. Atwell. Elec. Jl., vol. 21, no. 11, Nov. 1924, pp. 513-516, 8 figs. Reasons for their use; lubrication;** amount and renewal of lubricant; removal and reapplication of ball bearings.

Motor. Ball Bearings for Motors, C. Huey. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 4, Nov. 1924, pp. 624-647. Presents advantages, disadvantages, limitations, and design data.

Mounting. **Ball Bearings: Their Proper Function and Methods of Mounting, F. J. Taylor. Mech. Wld., vol. 75, no. 1953, June 6, 1924, pp. 353-354, 9 figs.**

Roller and. Ball and Roller Bearings. Iron & Steel Engr., vol. 1, no. 5, May 1924. Contains following papers: Application of Taper Rollers Bearings, T. V. Buckwalter, pp. 210-214, 1 fig.; Application of Anti-Friction Bearings, F. W. Gurney, pp. 214-217; Mounting and Maintenance of Roller Bearings on Electric Motors, D. E. Batesole, pp. 217-220, 7 figs.; Ball Bearing Applications and Maintenance, H. R. Reynolds, pp. 221-224, 5 figs.; Application of Anti-Friction Bearings, H. E. Brunner, pp. 225-229, 7 figs.; Selection, Installation and Operation of Anti-Friction Bearings, J. T. R. Bell, pp. 229-234, 8 figs.; Mounting and Maintenance of Roller Bearings in Electric Motors, U. B. Wachtler, pp. 234-244, 7 figs.; Design and Application of Ball Bearings, T. D. Crow, pp. 245-248, 9 figs. See also Discussion, pp. 256-278.

Swedish Disk and Ball Bearings of High Carrying Capacity. Automotive Industries, vol. 51, no. 22, Nov. 27, 1924, pp. 918-919, 5 figs. Describes ball and roller bearings of Swedish manufacture, known as N. K. A., said to possess unusually high carrying capacity for given size and to be well adapted for high speed.

Spiro. The Spiro Ball Bearing. Machy. (Lond.), vol. 25, no. 633, Nov. 13, 1924, pp. 210-213, 7 figs. Bearing with spiral series of balls for heavy loads at high speeds.

Stainless-Steel. Carrying Capacity of Ball Bearings Made of Stainless Steel, A. Hultgren. Am. Soc. for Testing Mats.—Reprint of paper for meeting June 24-27, 1924, no. 19g, 7 pp. Brief summary of series of tests of stainless steel as a ball-bearing material conducted during past six years in Gothenburg Laboratory of Aktiebolaget Svenska Kullagerfabriken; stainless steels from an American, a British, and a Swedish source were used.

BEARINGS, ROLLER

Ball and. See BEARINGS BALL, Roller and.

Bridge. Permissible Loading on Rollers Between Plane Surfaces (Sur la charge limite ad-

missible de rouleaux en contact avec des chemins de roulement plans), A. Dumas. Bulletin Technique de la Suisse Romande, vol. 50, no. 12, June 7, 1924, pp. 148-152, 2 figs. Results of tests to determine load that can be applied without producing permanent deformations.

Recommendations for Standard Bridge Bearings (Vorschläge für ein einheitliches Brückenlager), H. Kirchner, Bautechnik, vol. 2, no. 18, Apr. 25, 1924, 2 figs. Discusses Karig's recommendations for economical roller bearing, published in same journal, Sept. 7-Oct. 5, 1923; author makes recommendations for calculation and dimensioning of separate bearing parts.

Repairing a Skewed and Displaced Bridge Roller Bearing, Chas. F. Draper. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, p. 810, 2 figs. New rollers placed in bearing of 250-ft. span with cam teeth engaging shoe plates to maintain alignment.

Colliery Equipment. Roller and Ball Bearings for Colliery Equipment, R. H. Boyd. Colliery Eng., vol. 1, nos. 2, 3 and 5, Apr., May and July, pp. 93-95, 121-122 and 236-239, 24 figs. Discusses various types of anti-friction bearings available for use underground. Adoption of anti-friction bearings to above-ground machinery.

Connecting Rods. Roller Bearings for Connecting Rods (Rollenlager für Pleuel stangen), J. Dauben. Motorwagen, vol. 27, no. 30, Oct. 31, 1924, pp. 541-545, 8 figs.; and (translation in abstract) in Automotive Industries, vol. 51, no. 23, Dec. 4, 1924, pp. 964-965, 7 figs. Designs used and proposed for mounting connecting-rod-head roller bearings; motorcycle, racing and dirigible engines have been successfully fitted with anti-friction bearings at crankpin; problem not solved for automobile engines.

Design. Roller Bearings Facilitate Speed, D. E. Batesole. Iron Trade Rev., vol. 75, no. 3, July 17, 1924, pp. 164-166, 6 figs. High-precision units of roller type withstand heavy load capacity and resistance to severe shock. Choice of bearing depends upon operating conditions and design. Describes principle of construction.

Development. See BEARINGS, BALL, Development.

Electrical Machinery. See BEARINGS, BALL, Electrical Machinery.

Manufacture. The Manufacture of Tapered Roller Bearings, M. T. Lothrop. Am. Mach., vol. 61, nos. 21 and 22, Nov. 20 and 27, 1924, pp. 803-807 and 833-857, 31 figs. Nov. 20: Practice at Timken roller-bearing plant continuous process from ore pile to finished product; uniform control of material processes, assembly, installation, and use; grinding and inspecting to quarter-thousandth limits. Nov. 27: Hardness tests; inspecting 39 types of defects; automatic machines for grinding and gaging.

Motors. Roller Bearing Service in Mill-Type Motors, L. J. Hess. Indus. Engr., vol. 82, no. 4, Apr. 1924, pp. 164-168, 6 figs. Methods of installation and results obtained from use of roller bearings in 300 heavy-duty motors.

Railway Journal Boxes. Standardization of Journal Boxes with Roller Bearings for Railway Cars (Normung von Achsbuchsen mit Rollenlagern von Schienenfahrzeugen), O. R. Wikander. Zeit. des Vereines deutscher-Ingenieure, vol. 68, no. 19, May 10, 1924, pp. 474-475, 3 figs. Reasons for installation of only one roller bearing in railway journal boxes; advantages of journal box standardization for simple determination of suitable roller bearing, based on proposed international standard dimensions and tolerances of roller bearings.

Railway Motor Cars. New Tests with Roller Bearings on Railway Motor Cars (Neuere Versuche mit Rollenlagern an Oeltriebwagen), W. Bethge. Motorwagen, vol. 27, no. 1, Jan. 10, 1924, pp. 6-7, 1 fig. Advantages and economy of roller bearings compared with journal bearings.

Railway Rolling Stock. Comparison of Ball and Roller Bearings (Comparaison des paliers à billes et à rouleaux), A. Bijls. Génie Civil, vol. 84, no. 7, Feb. 16, 1924, pp. 159-161, 6 figs. Comparison of two systems in their application to railway rolling stock, showing advantages of roller bearings.

Roller Bearings for Railway Rolling Stock (Rollenlager für Eisenbahnfahrzeuge), W. Linder. Kruppsche Monatschefte, vol. 5, Aug.-Sept. 1924, pp. 187-189, 2 figs. Design of Krupp bearings, function of parts, lubrication, etc.

Rolling-Mill. Rolling-Mill Bearings (Neue Walzenlagerungen), C. Holzweiler. Stahl u. Eisen, vol. 44, no. 16, Apr. 17, 1924, pp. 425-430, 13 figs. Also Iron Age, vol. 114, no. 8, Aug. 21, 1924, pp. 442-443, 5 figs. Design of bearings made by Witkowitz Steel Works; automatic Stauffer lubrication; treatment of bushings; SKF roller bearings (made in Gothenburg, Sweden); combination of roller and ball bearings; results of tests.

Shipbuilding. Rolling Bearings in Shipbuilding and Ship-Machinery Construction (Das Wälzlager im Werft- und Schiffsmaschinenbau), Muller-Rentzsch. Schiffbau, vol. 25, no. 10, Feb. 27, 1924, pp. 242-247, 16 figs. Describes different types of roller bearings and their applications, especially to cranes.

Steel Tubes for. See TUBES, Steel.

Tapered. Production and Application of Tapered Roller Bearings. Machy. (Lond.), vol. 24, nos. 604, 605, and 606, Apr. 24, May 1, and 8, 1924, pp. 108-111, 129-131, and 161-165, 21 figs. Timken bearing and its production by Brit. Timken Ltd., Birmingham, Eng.

Taper Roller Bearings. Automobile Engr., vol. 14, no. 191, July 1924, pp. 196-197, 10 figs. New type with rollers guided from race.

BEARINGS, THRUST

Michell. Thrust Blocks for the SS. "Empress of Australia." Engineering, vol. 117, no. 3035, Feb. 29, 1924, pp. 268-269, 9 figs. on p. 272. Describes installation of modified form of Michell thrust, utilizing existing thrust shaft, and fitting into existing housing.

Pad Type. Thurst Bearings of Pad Construction, F. Johnstone-Taylor. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 619-621, 5 figs. Construction of pad thrust collars; pad system applied to thrust washers; thrust washer for vertical shaft; end thrust bearings of pad construction; etc.

Propeller. Modern Shaft Bearings (Moderne Wellendrucklager), J. Schowalter. Wärme, vol. 47, no. 31, Aug. 1, 1924, pp. 359-361, 6 figs. Comparison of design and working of a collar thrust bearing and a Vulcan single-disk segmental bearing for a propeller running at 75 r.p.m. and for 20,000 kg. thrust, and their field of application.

BELLS

Founding. Modern Bell Founding, W. Lambert and G. Hall. Am. Foundrymen's Assn.—Preprint of paper no. 419, for meeting, Oct. 11-16, 1924, 29, pp. 13 figs. See also Foundry, vol. 52, nos. 22, 23 and 24, Nov. 15, Dec. 1 and 15, 1924, pp. 885-887, 924-926 and 978-979, 14 figs. and Foundry Trade Jl., vol. 30, no. 429, Nov. 6, 1924, pp. 391-395, 3 figs. Historical notes on bells and early methods used in founding; description of number of best-known bells; molding practice in modern bell founding; metallurgical notes on

bell metal. Exchange paper between Inst. Brit. Foundrymen and Am. Foundrymen's Assn.

BELT DRIVE

Arc of Contact, Increasing. Methods That May be Appied for Increasing Arc of Contact With Low Belt Tension, F. E. Gooding. Indus. Engr., vol. 82, no. 9, Sept. 1924, pp. 417-422 and 455, 16 figs. Describes special mechanical means whereby distance between shafts may be shortened and pulley ratios increased over usual recommended practice.

Group vs. Individual Drive. A Comparison of Group and Individual Drive, R. W. Drake. Indus. Mgt. (N. Y.), vol. 68, no. 3, Sept. 1924, pp. 178-183, 6 figs. Analysis of factors which govern a choice.

Principles. Power Transmission by Belting, J. E. Rhoads. Paper, vol. 33, no. 21, Mar. 13, 1924, pp. 11-12. Some of the principles entering into power transmission by belting.

Short-Center. Short Belt Drives, V. Sahmel. Paper Trade Jl., vol. 78, no. 19, May 8, 1924, pp. 61-64, 7 figs. Fundamental formula for belt drives; advantages of short-center drive; floating idlers, beaters, etc.

Short-center Belt Drives, G. A. Frenkel. Machy. (N. Y.), vol. 30, nos. 10, 11, and 12, June, July, and Aug. 1924, pp. 747-753, 876-882, and 956-958, 23 figs. Deals with efficient transmission of power by belting, as determined by numerous experiments and extensive research. June: General characteristics, advantages, and methods of arrangement to meet different requirements. July: Determining coefficient of friction and procedure in designing drive for transmitting given amount of power. Aug: Tension rollers and their bearings; arms, equalizing weights, fulcrum stands and shock absorbers. See also Machy. (Lond.), vol. 24, nos. 612, 615, and 620, June 19, July 10, and Aug. 21, 1924, pp. 353-358, 457-462 and 645-647, 23 figs.

BELTING

Conveyor. See Lumber Industry.

Creep of. A Discussion of Belt Creep and Its Effect on the Application of the Fundamental Formula, R. F. Jones. Sibley Jl. of Eng., vol. 38, no. 7, Oct. 1924, pp. 173-175 and 185, 3 figs. Discusses slippage caused by elastic give and return of belt, called creep; slippage not due to elastic action, called true slip; and total slip, which is a combination of both creep and true slip; their effect in calculation.

Electric Sparks from. Spark Formation on Driving Belts (Funkenbildung an Treibriemen, M. Jürgensen. Gas- u. Wasserfach, vol. 67, no. 28, July 12, 1924, pp. 411-412. Discusses electric potential on gas compressor belt, due not to slip of belt, but to presence of wax, etc.

Endless. See Leather.

Installation and Care. Installation and Care of Belting, C. O. Streeter. Paper, vol. 34, no. 3, May 8, 1924, pp. 90-91, 11 figs. Points in the purchasing of leather belting; approved types of belt drives; aligning and care of belts to avoid injury.

Leather. Chrome Leather for Belts, L. Balderston. Am. Leather Chemists Assn.—Jl., vol. 19, no. 9, Sept. 1924, pp. 521-525 and (discussion) 525-527. Discusses chrome belts and divergent views as to their keeping quality, some behaving as well as oak belts, others failing. Question of free H_2SO_4.

Making Leather Belts Endless, L. W. Arny. Paper Trade Jl., vol. 79, no. 10, Sept. 4, 1924, pp. 43-47, 18 figs. Tools required; describes making of laps, shortening narrow belts which have been endless, making an endless joint in a belt which has been laced or hooked, making new belts endless, cements, etc.

Slip, Friction and Stretch Tests for Leather Belting, L. C. Morrow. Am. Mach., vol. 60, no. 13, Mar. 27, 1924, pp. 469-471, 8 figs. Describes tests performed in plant of J. E. Rhoads & Sons, Philadelphia, Pa.

Lumber Industry. Transmission and Conveyor Belts in New Long-Bell Lumber Mill, W. A. Scott. Belting, vol. 25, no. 3, Sept. 1924, pp. 21-24, 9 figs. Large new plant of Long-Bell Lumber Co., Longview, Wash., contains latest improved design of modern equipment; belting installations highly efficient.

Materials. Belting Materials, G. A. Frenkel. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 14-16, 1 fig. See also Machy. (Lond.), vol. 25, no. 637, Dec. 11, 1924, pp. 337-341, 1 fig. Physical properties and general characteristics of leather, rubber, cotton, and steel belting.

Rubber. How Much Power Is That Rubber Belt Transmitting? W. F. Schaphorst. Belting, vol. 25, no. 3, Sept. 1924, pp. 29-30, 1 fig. Gives table for determining horsepower being transmitted by rubber belt.

Rubber Belting, G. A. Frenkel. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 122-124. Data and formulas required in designing rubber-belt transmissions.

Standardization. How Belting Was Standardized in a Large Automotive Plant, H. A. Flogaus. Belting, vol. 24, no. 6, vol. 25, nos. 1, 2, 3, 4, and 5, June, July, Aug., Sept., Oct., and Nov., 1924, pp. 19-24, 17-21, 17-22, 25-27, 23-25, and 17-20, 25 figs. Transmission survey covered 18 months; power-transmitting property of leather belting depends chiefly on pulley-side finish and stuffing; methods of making power and slip tests; wide variations in characteristics of belts of same type; belt-splicing methods; belt-dressing problem; economies obtained through idlers; example of savings from belting some machines alike; reclamation of leather and rubber belting; effect of shaft misalignment on belt life; economy of crown pulleys, etc.

Testing. The Scientific Testing of Belting for Power Transmission, C. D. Miller. Belting, vol. 25, no. 5, Nov. 1924, pp. 25-29, 1 fig. Principles relating to mechanics and properties of matter that should govern such testing.

Types. Characteristics and Attributes of Certain Classes of Belting, W. Staniar. Belting, vol. 25, no. 3, Sept. 1924, pp. 17-20, 2 figs. Combination of oak and special tannage declared "last word" in leather belting; other types also show improvement; discusses leather, rubber, metallic stitched fabric, and solid woven hair belting.

Means for Power Transmission (Einiges über Kraftübertragungsmittel), A. Stehlik. Sparwirtschaft, nos. 15-16 and 17-18, Aug. and Sept. 1924, pp. 79-80 and 89-95 (AWB). Discusses rope and belt drives, including kinds of ropes and belting, and care and management.

BELTS. See BELTING.

BENDING

Theory. The Center of Shear (Der Schubmittelpunkt), Rob. Maillart. Schweizerische Bauzeitung, vol. 83, no. 10, Mar. 8, 1924, pp. 109-111, 5 figs. Refers to author's previous articles in same journal on bending problem, and by experimental determination of shearing center, it is shown that an unsymmetrical profile conforms to law of classic bending theory the same as symmetrical.

BENZENE. See BENZOL.

BENZOL

Content in Coal Gas, Measurement of. Apparatus for Measuring Benzol Contents of Coal Gas

in Benzol Factories (Ein Benzolbestimmungsapparat für den Betrieb), A. Bürger. Chemiker-Zeitung, vol. 48, no. 35, Mar. 20, 1924, p. 161, 1 fig. Describes apparatus consisting of U-tube containing activated charcoal, and two stopcocks at either end; U-tube is placed in connection with source of steam on one side and condenser and measuring flask on other.

Production from Acetylene. Benzol Produced from Acetylene. Automotive Industries, vol. 50, no. 3, Jan. 17, 1924, p. 123. Produced by polymerization, i.e., three molecules of acetylene (C_2H_2) can be combined into one molecule of benzene (C_6H_6), which later is chief constituent of commercial benzol. Experiments described in recent note by N. D. Zelinsky presented to French Acad. Sciences.

Recovery. Action of Benzol Wash Oils on Lead, A. Schneider and E. Jenniger. Am. Gas Jl., vol. 120, no. 3, Jan. 19, 1924, pp. 51-52. Results of investigation to determine whether normal wash oil (or its constituents) is able to corrode and dissolve lead; carried out as result of report from a certain gas works where benzol was recovered from gas by absorption in wash oils and where wash oils, containing benzol, were stored and subjected to further treatment to remove their benzol content, that oils appeared to have some effect on lead packings and, in fact, seemed to possess power of destroying lead. Translated from Gas u. Wasserfach, 1923, p. 369.

Activated Carbon for Recovering Benzene from Gas, M. Steding. Am. Gas Jl., vol. 121, no. 1, July 5, 1924, pp. 611-612 and 625, 2 figs. Discusses advantages and drawbacks of recovery by wash oil process and by activated charcoal or Bayer process, German patent no. 310,092. Translated from Gas u. Wasserfach.

Benzole Extraction and Naphthalene. Gas Jl., vol. 165, no. 3167, Jan. 23, 1924, pp. 203-204, 1 fig. Solubility and vapor pressure of naphthalene.

Determination of Benzol in Illuminating Gas by Means of Active Charcoal (Beitrag zur Benzolbestimmung in Leuchtgas mittels aktiver Kohle), W. Gollmer. Zeit. für angewandte Chemie, vol. 37, no. 40, Oct. 2, 1924, pp. 773-775, 2 figs. Describes apparatus in which 98 per cent of adsorbed benzol is recoverable by steaming for one-half hour at 300 deg., without any catalytic action of charcoal on light oil vapor being observed.

Present Process of Benzol Recovery From Gas (Les Procédés actuels de débenzolage du gaz), Ch. Dantin. Génie Civil, vol. 85, no. 21, Nov. 22, 1924, pp. 472-475, 4 figs. Discusses debenzolizing by cooling, by liquid absorbents, and by solid absorbents, and plants used, and gives comparative results.

The New Raschig Process for the Recovery of Benzol (Das neue Benzolgewinnungsverfahren von Raschig), B. Neumann. Glückauf, vol. 60, no. 5, Feb. 2, 1924, pp. 69-75, 2 figs. Also Iron & Coal Trades Rev., vol. 108, no. 2923, Mar. 7, 1924, p. 392, 2 figs. Describes new vacuum process and points out advantages resulting from its use.

Sulphonation. The Sulfonation of Benzene, A. W. Harvey and G. Stegeman. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 842-845, 7 figs. Study of sulphonation of benzene resulting from passage of vaporized benzene through sulphuric acid.

Vapor, Specific Volume. See VAPORS, Specific Volumes.

Washing. Direct and Indirect Cooling of Benzol Wash Oil (Ueber direkte und indirekte Waschölkühlung), H. Kiemstedt. Gas- u. Wasserfach, vol. 67, no. 28, July 12, 1924, pp. 406-407. Principles of direct and indirect cooling are compared; direct coolers are simpler in design, more efficient, and have lower capital and maintenance charges than indirect coolers, but they require large volume of cooling water from which heat is not recovered, calculations are made showing saving of steam in indirect process which far outweighs its disadvantages; recommends combination of the two systems.

Direct Cooling of Benzol Wash Oil (Unmittelbare Kühlung des BenzolWaschöls), T. Werner. Gas- u. Wasserfach, vol. 67, no. 5, Feb. 2, 1924, pp. 49-51, 4 figs. Benzol wash oil, from which benzol has been distilled, is fed into top of closed cooling tank and flows down over series of shelves to bottom of cooler; stream of water is there introduced and flows on top of heavier oil in opposite direction to top of cooler; special pipes are provided to prevent water from mixing with oil; apparatus is said to be cheaper to build, more economical, and to have longer life than indirect coolers, and to be more efficient in action; water does not extract any constituents of value from wash oil.

Lignite Paraffin Oil, a Benzol Wash-Oil Not Requiring Regeneration (Braunkohlenparaffinöl ein nicht regenerierbedürftiges Benzolwaschöl), A. Thau. Gas- u. Wasserfach, vol. 67, no. 13, Mar. 29, 1924, pp. 163-165. Fraction of lignite tar containing paraffin wax, after removal of wax, forms very suitable solvent for benzol recovery, in place of customary "heavy oil" from coal tar; oil retains its fluidity over long periods, does not require regeneration by distillation, and separates sharply from water; sharp separation of the oil from water renders possible use of direct-water cooling.

Limitation of the Consumption of Wash Oil in a Benzol Plant, and Cause of the Thickening of the Oil (Wodurch wird der Waschölverbrauch einer Benzolanlage bedingt und welche Ursachen führen zur Verdickung des Oeles?). Gas- u. Wasserfach, vol. 67, no. 6, Feb. 9, 1924, pp. 67-69, 2 figs. Experiments on full-sized benzol recovery plant show that loss of wash oil occurs during its treatment with steam to recover benzol; this loss is made up of any oils with boiling point below 240 deg., naphthalene, and phenols; it is therefore of advantage to have these constituents as low as possible in fresh oil, with proviso that initial naphthalene content is not less than 10 per cent; explains cause of thickening and tells how to avoid it.

Operation of Benzol Washer (Aus der Praxis der Benzolwäsche), E. Schumacher and J. Becker. Gas- u. Wasserfach, vol. 67, no. 39, Sept. 27, 1924, pp. 583-585. Points out that gas passing to benzol washer should be well cooled and free from tar and ammonia, and as far as possible from naphthalene; fresh wash oil must not contain anthracene, and naphthalene content ought not to exceed 12 per cent; throughout process careful temperature control is necessary.

Thickening of Benzol Wash Oil (Beiträge zur Kenntnis des Verdickungsvorganges bei dem Benzol-Waschöl), R. Kattwinkel. Gas- u. Wasserfach, vol. 67, no. 32, Aug. 9, 1924, pp. 474-475. Examination of incrustation which forms on heating elements of wash-oil heaters indicates that thickening is due to polymerization under action of heat and sulphuric acid; formation of sulphuric acid is due to oxidation of hydrogen sulphide by air present in wash oil, any iron salt present promoting oxidation; sulphonic acids are also produced.

BENZYL ALCOHOL

Manufacture. The Manufacture of Benzyl Alcohol. Chem. Trade Jl. & Chem. Engr., vol. 75, no. 1961, Dec. 19, 1924, pp. 733-734. Details of a British war-time process.

BERYLLIUM

Extraction from Beryl. Extraction of Beryllium from Beryl, E. A. Engle and B. S. Hopkins. Eng. & Min. Jl.-Press, vol. 118, no. 2, July 12, 1924, pp. 49-50. Describes method of sintering with sodium fluosilicate followed by solution in water. Beryl is a beryllium aluminum silicate with beryllium content varying from 10 to 14 per cent beryllium oxide.

Metallurgy. The Metallurgy and Alloys of Beryllium, E. A. Engle and B. S. Hopkins. Am. Electrochem. Soc.—Advance Paper, no. 17, for meeting Apr. 24-26, 1924, pp. 255-262. Critical study of electrometallurgy of beryllium. See also Advance Paper no. 18, pp. 263-268, 1 fig., entitled, The Electrolytic Production of Beryllium, B. S. Hopkins and A. W. Meyer.

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BINS

[See also SILOS.]

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Suspension. Design of Large Suspension Bins, H. K. Burch. Eng. & Min. Jl.-Press, vol. 118, no. 15, Oct. 11, 1924, pp. 566-568, 2 figs. Two types and results that they gave in operation.

BISMUTH

Alloys. On the Thermo-Electric Properties of Bismuth Alloys, with Special Reference to the Effect of Fusion. With a Note of Thermo-Electric Re-Inversion, C. R. Darling and R. H. Rinaldi. Physical Soc. of Lond.—Proc., vol. 36, part 4, June 15, 1924, pp. 281-287, 4 figs. Investigation to obtain new data regarding thermoelectric properties of alloys in liquid state and note changes in region of melting point.

Determination in Copper Precipitate. The Determination of Bismuth in Copper Precipitate. Metal Industry (Lond.), vol. 25, no. 18, Oct. 31, 1924, pp. 417-418. Particulars of method employed by author.

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BITUMINOUS SANDS

Alberta, Canada. Bituminous Sands of Northern Alberta, S. C. Ells. Can. Min. Jl., vol. 45, nos. 13 and 17, Mar. 28 and Apr. 25, 1924, pp. 298-304 and 400-403, 5 figs. Also Petroleum Wld., vol. 21, nos. 283 and 287, Apr. and Aug. 1924, pp. 152 and 328-336, 1 fig. General description of area underlaid by bituminous sand; general description of deposits; prospecting; sampling and laboratory determination; characteristics of sand; use of bituminous materials for pavement construction; recovery of hydrocarbons and bitumen; production of petroleum. Pub. with permission Ottawa, Can., Dept. Mines.

Bitumen Separation from. Making Bituminous Sands of Practical Use, K. A. Clark. Contract Rec., vol. 38, no. 44, Oct. 29, 1924, pp. 1072-1076, 1 fig. Scientific and Indus. Research Council of Alberta has conducted and operated a plant for separation of bitumen; details of scheme and cost of process.

BLAST-FURNACE GAS

Cleaning. Dry Cleaning Blast Furnace Gas by Filtration Through Flue Dust, Geo. B. Cramp. Blast Furnace & Steel Plant, vol. 12, no. 2, Feb. 1924, pp. 101-103, 2 figs. Careful tests and investigation of conditions at each individual blast furnace necessary in determining area of dry cleaner.

Electric Cleaning of Blast Furnace Gas. Iron Age, vol. 114, no. 9, Aug. 28, 1924, pp. 502-503. Analysis of losses incurred by releasing latent and sensible heat of gases. Comparison with manufactured gas and its sales value.

Electrical Cleaning of Blast Furnace Gases, N. H. Gellert. Blast Furnace & Steel Plant, vol. 12, no. 9, Sept. 1924, pp. 423-426. Discussion of different methods.

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furnace gas by means of electricity is possible technically even under unfavorable circumstances. Difficulty of dust question, general conclusions as to advantages of electric cleaning over previous systems.

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Recent Results of Electric Gas Purification (Neuere Ergebnisse mit der elektrischen Gasreinigung), R. Durrer. Stahl u. Eisen, vol. 44, no. 28, July 10, 1924, pp. 809-814, 9 figs. Describes plant for electric purification of iron blast-furnace gas at Dillinger Iron Works and results obtained.

Removing Dust from Blast Furnace Gases, N. H. Gellert. Iron Age, vol. 113, no. 6, Feb. 7, 1924, pp. 422-425, 1 fig. Electrolytic process installed by Colorado Fuel & Iron Co.; corona discharge produces ionized field which precipitates dust. (Abstract.)

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See also PRECIPITATION, Cottrell Process.

Composition. Composition of Blast-Furnace Gas (Sur la composition des gaz de hauts fourneaux), J. Seigle. Académie des Sciences—Comptes Rendus, vol. 178, no. 17, Apr. 22, 1924, pp. 1426-1429, 2 figs. With aid of graphic presentation author discusses possible proportions of carbon dioxide and monoxide in gas at mouth of blast furnace, Gruner's ideal point, extreme values of volume of oxygen reduced per kg. of carbon, possible compositions of gas produced when dry air containing 20 per cent of oxygen, or air enriched in oxygen, or pure oxygen is used for blast, etc.

Control Apparatus. Control Tests of Blast-Furnace-Gas Apparatus: Air Heaters, Gas Engines and Boilers (Regulierversuche an den Hochofengasverbrauchern: Winderhitzer, Gasmaschinen und Kessel), M. Steffes. Wärme, vol. 47, no. 43, Oct. 24, 1924, pp. 503-506, 11 figs. Discusses excess air and efficient combustion; characteristics of combustion; gives in diagrams and tables results of tests carried out.

Economical Use. Blast-Furnace Gas Economy in German Iron Works, K. Rummel. Iron & Coal Trades Rev., vol. 109, no. 2943, July 25, 1924, pp. 156-157, 6 figs. Discusses economic uses of gases, gas-fired vs. coal-fired boilers, gas-engine power stations vs. steam-turbine power stations with gas-fired boilers, waste-heat boilers behind gas engines, etc. (Abstract.)

Purification. Effect of Method of Purification on the Value of Blast-Furnace Gas (Influence du mode d'épuration sur la valeur du gaz de haut-tourneau), E. Lavandier and M. Gangler. Revue de Métallurgie, vol. 29, no. 9, Sept. 1924, pp. 501-512, 5 figs. Results of experiments show that wet purification reduces temperature of gas, but in spite of this loss thermic potential of cooled gas is superior even to that of gas escaping from throat (110 to 130 deg. cent.).

Steel Works. Economical Use of Blast-Furnace Gas in Steel Works (Die Hochofengaswirtschaft auf Eisenhüttenwerken), K. Rummell. Zeit. des Vereines deutscher Ingenieure, vol. 44, no. 68, Nov. 1, 1924, pp. 1137-1144, 12 figs. Heat and energy distribution; distribution of blast-furnace gases; steam-turbine plant with gas or coal firing; gas-engine power plants and steam-turbine plants with gas firing; waste-heat boiler for gas engines; distribution and storage of gas; measures for obtaining good gas distribution.

Utilization. See STEEL WORKS, Blast-Furnace-Gas Utilization.

BLAST FURNACES

Air Heaters. Results of Operations With Stone Filler at the Sophien Works of Burderuss Iron Works (Ueber die Betriebsergebnisse mit Semmelsteinen auf der Sophienhütte der Buderusschen Eisenwerke in Wetzlar a. d. Lahn), K Harnickell. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Hochofenausschuss), no. 66, May 10, 1924, 8 pp., 9 figs. Details of tests carried out with air heater having a stone filler or checker work 5.5 m. in height (consisting of small pieces of hollow pipe), considerably increasing heating surface.

The Development of Air-Heater Apparatus in Blast Furnaces (Die Entwicklung der Winderhitzer-Apparate beim Hochofen), Illies. Feuerungstechnik, vol. 12, nos. 16 and 17, May 15 and June 1, 1924, pp. 133-136 and 144-145, 9 figs. The beginning of air heating in Germany; steel air-heating apparatus; introduction of checker-brick heaters; the Pfoser-Strack-Stumm process.

Blowing Engines. See BLOWERS.

British Practice. Modern British Blast Furnaces, F. Clements. Iron & Coal Trades Rev., vol. 108, nos. 2936 and 3937, June 6 and 13, 1924, pp. 959-965 and (discussion) 1024, 9 figs. Description with statistics of certain blast-furnace plants in England of a more modern type as representing position to which British design and practice has advanced.

Charge, Behavior of. The Behavior of the Charge in Blast Furnaces (Ueber das Verhalten der Beschickung in Hochofen), E. Diepschlag. Stahl u. Eisen, vol. 44, no. 16, Apr. 17, 1924, pp. 430-432. Heating and reactions; lowering and suspension of charges; wastes. See translated abstract in Iron & Coal Trades Rev., vol. 109, no. 2961, Nov. 28, 1924, p. 871.

Charging. Automatic Charging Devices for Blast Furnaces (Aufgebe-Vorrichtungen für Hochöfen), D. H. Dresler. Stahl u. Eisen, vol. 44, no. 33, Aug. 14, 1924, pp. 973-976, 8 figs. Discusses importance of uniform distribution of gases; favorable operating results with charcoal furnaces in Steiermark and Sweden; details of new devices for any desired distribution of charge; results obtained.

Progress in Charging Blast Furnaces (Fortschritte auf dem Gebiet der Hochofen-Beschickungsanlagen), J. Strudthoff. Siemens-Zeit., vol. 4, no. 9, Sept. 1924, pp. 285-296, 27 figs. Discusses developments due to change from steam to electricity and describes modern equipment such as used by Georg-Marien works for five blast furnaces.

Cowper Stoves. Progress Made in Construction and Operation of Cowpers (Progrès réalisés dans la construction et la conduite des appareils Cowper), A. Cousin. Revue Universelle des Mines, vol. 4, no. 1, Oct. 1, 1924, pp. 6-16, 3 figs. Discusses application of forced draft, and arrangement of the various parts so as to reduce heat loss by radiation, and gives results thus obtained.

Recording and Measuring Composition of Cowper Waste Gases (Zur registrierenden Messung der Zusammensetzung von Cowperabgasen), H. Pinsl. Feuerungstechnik, vol. 13, nos. 1 and 2, Oct. 1 and 15, 1924, pp. 1-2 and 14-16, 6 figs.

Discusses ambiguity of CO_2 indication, relation between gas and waste gas in incomplete combustion, and describes apparatus for automatic CO analysis made by Mono Co. of Hamburg.

Design. Interior Profiles of Modern Blast Furnaces (Die inneren Formen neuzeitlicher Hochöfen), G. Jantzen. Stahl u. Eisen, vol. 44, no. 24, June 12, 1924, pp. 681-684. Examples of old and new cross-sectional profiles; dropping of charge, conclusions for interior profile of furnace, gasification of coke and diameter of hearth, uniform sizing of elements of charge, etc.

Progress in Blast Furnaces (Considérations sur les progrès réalisés dans les hauts-fourneaux), R. Jordan. Revue de Métallurgie, vol. 21, nos. 3 and 4, Mar. and Apr. 1924, pp. 127-142 and 223-232, 20 figs. Critical examination of problems and soluntions relating to progress in blast-furnace design during last 20 years. Mar.: Charging apparatus. Apr.: Determination of cross-section; details of construction.

Progress Made in the Production of Pig Iron and the Construction of Blast Furnaces (Progrès réalisés dans la fabrication de la fonte et la construction des hauts fourneaux), J. Estour. Technique Moderne, vol. 16, no. 9, May 1, 1924, pp. 309-319, 13 figs. Notes on constitution of pig iron; manufacture and combustibility of coke; enrichment, briquetting and sintering of ore; cross-section and dimensions of blast furnaces; design; charging apparatus.

Dismantling. Dismantling Old Stacks by Blasting, J. R. Briggs. Iron Trade Rev., vol. 75, no. 7, Aug. 14, 1924, pp. 484-486, 5 figs. Methods employed in dismantling blast furnaces.

Electric. Gas Economics in Operation of Electric Blast Furnaces (Betrachtungen über die Gaswirtschaft im Elektrohochofenbetriebe), R. Durrer. Stahl u. Eisen, vol. 44, no. 26, June 26, 1924, pp. 748-750. Calculation of gas conditions in electric blast furnaces; proposes to conduct operations in such way that whole of gas is used in electric blast furnace itself.

Evolution. The Blast Furnace. Metal Industry (Lond.), vol. 24, no. 6, Feb. 8, 1924, pp. 129-130 and 134, 3 figs. Deals with evolution of blast furnace, with object of showing large number of variables that have to be controlled in modern practice in order to produce regular irons of both satisfactory analysis and fracture.

Fuel Economy. The Law of Heat Concentration and Fuel Economy in Blast Furnaces (La loi de la compression de la chaleur et l'économie de combustible dans les hauts fourneaux), A. Korevaar. Chimie & Industrie, vol. 11, no. 4, Apr. 1924, pp. 642-650, 2 figs. Deduction of law of heat concentration; variations of factors depending on carbon; problem of combustibility of fuels; factors depending on air and concentration of heat, and on furnace and concentration of heat; influence of conduction; analysis of fuel consumption in blast furnace; influence of inflammability of coke on fuel consumption; influence of preheating of air and of furnace diameter.

Fuel Regulation. Uniform Coking Coal Is Needed, W. Mathesius. Iron Trade Rev., vol. 74, no. 22, May 29, 1924, pp. 1422-1424, 3 figs. Regulation of blast-furnace fuel in accordance with principles of iron-ore trade; author urges analysis as basis of accounting for furnace fuel. (Abstract.)

Gas. See BLAST-FURNACE GAS.

Gas-Engine Plant. See GAS ENGINES, Blast-Furnace Plant.

Hearth Temperature. Significance of the Hearth, P. H. Royster, T. L. Joseph and S. P. Kinney. Blast Furnace & Steel Plant, vol. 12, no. 3, Mar. 1924, pp. 154-158, 4 figs. Second series of Bur. of Mines report of data secured from experimental blast furnace, bearing on temperatures attained by slag, metal, and coke, in bottom of furnace.

Hot-Blast Stoves. Recent Experiences with Accelerated Heating of Hot-Blast Stoves, A. Wefelscheid. Fuels & Furnaces, vol. 2, no. 1, Jan. 1924, pp. 83-84, 2 figs. (Abstract.) Translated from Stahl u. Eisen, vol. 43, 1923, p. 1339.

Theory and Calculation of Hot-Blast Stoves (Zur Theorie und Berechnung der Winderhitzer), H. Gröber. Stahl u. Eisen, vol. 44, no. 2, Jan. 10, 1924, pp. 33-39, 9 figs. Discusses physical laws according to which heat circulates in stove, and describes method by which a scientifically perfect theory and calculation can be developed; results of this work are also applicable to regenerators of open-hearth furnaces and similar industrial furnaces.

Lead, Thermal Balance in. Thermal Balance in a Lead Blast Furnace, E. H. Hamilton. Min. & Metallurgy, vol. 5, no. 208, Apr. 1924, pp. 181-182, 1 fig. Results of 3-day test of furnace 48 by 160 in. in continuous operation during test; production and distribution of heat in lead blast furnace.

Linings. Reducing Lining Disintegration, H. E. Townsend. Iron Trade Rev., vol. 75, no. 3, Jan. 17, 1924, pp. 232-234, 2 figs. After two linings high in iron oxide had failed prematurely, a third lining low in iron oxide satisfactorily withstood disintegration on same furnace during 12-month campaign.

Low- vs. High-Pressure Blowing. Relation Between Cross Section of a Blast Furnace and Its Manner of Blowing (Relation entre le profil d'un fourneau et son mode de soufflage), M. Derclaye. Revue Universelle des Mines, vol. 1, no. 3, Feb. 1, 1924, pp. 146-184, 7 figs. Investigation to determine whether manner of blowing, that is, at low or high pressure, has relation to cross-section of blast furnace; characteristics of different types of blast furnaces; comparison between low-shaft and tall-shaft furnaces, showing advantages of former, with low-pressure blowing.

Mazout as Fuel for. See OIL FUEL, Mazout.

Metallic Obstructions, Formation of. Formation of Metallic Obstructions in Blast Furnaces (Sur la formation des loups dans les fours à cuve), B. Bogitch. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1177-1179. Formation of obstructions in blast furnaces in which matte is produced by melting oxides or silicates with calcium sulphate is invariably preceded by separation of melt into two layers, upper of high sulphur content and highly fusible, lower of small sulphur content and of higher melting point; latter sinks and, on cooling, forms obstruction; construction of furnace to avoid obstructions.

Modern Theories. The Practical Success of New Theories of the Blast Furnace (Ueber praktische Erfolge neuer Theorien des Hochofens). Stahl u. Eisen, vol. 44, no. 12, Mar. 20, 1924, pp. 311-317. Correspondence between K. Feist and W. Mathesius with reference to article by latter published in same journal (vol. 43, 1923, p. 873).

New Zealand. A Blast Furnace in New Zealand. Engineer, vol. 137, no. 3573, June 20, 1924, pp. 690-691, 9 figs. Particulars of plant put into operation at Onakaka, with productive capacity of 30 tons of pig iron every 24 hours.

Operation. Results of Experiments with Hollow Stone at the Sophein Works of the Buderns Iron Works in Wetzlar (Lahn) (Ueber die Betriebsergebnisse mit Semmelsteinen auf der Sophienhütte der Buderusschen Eisenwerke in Wetzlar a.d. Lahn), K. Harnickell. Stahl u. Eisen, vol. 44, no. 29, July 17, 1924, pp. 846-854, 9

figs. Communicated by Blast Furnace Committee of Verein Deutscher Eisenhüttenleute. Discusses experiments with air heaters or cowpers with stone filler, increase of resistance with height of filler; shows that even small quantities of stone filler considerably increase heating surface.

Practical Management. The Practical Management of Blast-Furnace Plants in Cleveland (Eng.), H. G. Scott. Iron & Coal Trades Rev., vol. 119, nos. 2959 and 2960, Nov. 14, and 21, 1924, pp. 784-785 and 826-828. Examines means of obtaining control of furnace; notes on the water evil; soft and dirty coke; Cleveland blast-furnace practice.

Practice, Alabama. Blast-Furnace Practice in Alabama, H. E. Mussey. Am. Inst. Min. & Met. Engrs.—Trans., no. 1376-S, Oct. 1924, 15 pp., 8 figs. In summarizing practice of district it may be stated that southern practice is disposed to carry higher stove temperatures than northern plants, also, blast volume for given size of stack is higher; increased production may be expected as result of even larger furnaces than those now classified as large.

Blast Furnace Practice in Birmingham District, R. H. Ledbetter. Iron Age, vol. 114, no. 18, Oct. 30, 1924, pp. 1128-1130. Number of furnaces and their features; cleaning gas; Bessemer iron from scrap. (Abstract.) Paper read before Am. Iron & Steel Inst.

Regenerators, Reversing. Theoretical Considerations Respecting Certain Features in the Working and Efficiency of Reversing Regenerators, J. Seigle. Iron & Steel Inst.—Advance Paper no. 14, for meeting May 1924, 47 pp., 28 figs. Author seeks to show that certain relations which have been accepted in metallurgical investigations on influence of mass of refractory bricks of checkerwork, and on amount of calories which are exchanged per sq. m. of heated surface, have been somewhat too roughly approximated.

Slag. See SLAG, Blast-Furnace.

Stock Descent in. Effect of Coke Combustibility on Stock Descent in Blast Furnaces, P. H. Royster and T. L. Joseph. Am. Inst. Min. & Met. Engrs.—Trans. no. 1307-S, Mar. 1924, 10 pp., 3 figs. Stock descent in blast furnace is affected by size of combustion zone which varies inversely with coke combustibility; predominating tendency is for coke to feed downward into space where combustion is taking place; discusses three types of combustion.

Superoxidized Air, Use of. The Use of More or Less Superoxidized Air in Blast Furnaces (Emploi d'air plus ou moins suroxygéné au haut-fourneau), J. Seigle, Revue de Métallurgie, vol. 21, no. 5, May 1924, pp. 260-264, 6 figs. Remarks based on note by M. Derclaye published in same journal, Dec. 1923.

Tuyeres. Number, Form, Diameter, and Position of Blast-Furnace Tuyeres. Effect of Their Number on the Efficiency of Blast Furnaces (Nombre, forme, diamètre et position des tuyères de hauts fourneaux. Influence du nombre des tuyères sur la marche du fourneau), M. M. Derclaye. Revue de Métallurgie, vol. 21, nos. 6, 7 and 8, June, July and Aug. 1924, pp. 315-337, 396-421, and 450-461, 14 figs. Calculation of tuyeres for any blast furnace; considerations limiting number of tuyeres, position of tuyeres round crucible, etc. Determination of total and partial heat balances. New theory of Mathesius and its application to heat balances.

BLASTING

Aluminum Cap. A New Aluminium Blasting Cap, W. H. Pay. Can. Min. Jl., vol. 45, no. 25, June 20, 1924, pp. 604-605, 1 fig. Aluminum detonator is superior to copper detonators. Remarkable features of cap is its moisture-resisting qualities; in point of fact, it is practically waterproof.

Coal Mines. See COAL MINING, Blasting.

Concrete Foundations. Blasting in Closed Spaces (Sprengungen in geschlossenen Räumen). Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 19, no. 9, Sept. 1924, pp. 139-140. Discusses application of disruptive explosives for removing machinery and other foundation work in manufacturing plants.

Drilling and. See QUARRIES, Drilling and Blasting.

Electric. Electric Blasting in Mines (Die elektrische Zündung im Bergbau), W. Vogel. Elektrischer Betrieb, vol. 22, no. 5, Mar. 10, 1924, pp. 37-40, 8 figs. Electric ignition of blasts in mines is accomplished almost exclusively by glow-wire detonators, any number of which may be connected in series for simultaneous shots; parallel connection of detonators is less and may cause unexploded shots; methods used of connecting individual blasts; in mines with electric traction and rail return, blasting accidents caused by erratic return currents are liable to occur; recommendations for prevention of mishaps.

Explosives. See EXPLOSIVES.

Hercoblasting. Hercoblasting, J. Barab. Explosives Engr., vol. 2, no. 2, Feb. 1924, pp. 41-43 and 48, 3 figs. Experience of a number of explosives users who have profitably employed this method on various kinds of work.

Hydraulic Cartridge. Hydraulic Cartridge Does Away with Explosives in Construction Operations. Contract Rec. & Eng. Rev., vol. 38, no. 17, Apr. 23, 1924, pp. 396-397, 1 fig. Details of new British machine, known as "hydraulic mining cartridge," especially applicable to removal of heavy concrete where effect of explosives cannot be accurately controlled. Wide range of usefulness.

Liquid-Air. Electric Firing of Liquid Air Cartridges (Die elektrische Zündung von Sprengluftpatronen), L. Lisse. Zeit. für das gesamte Schiess- und Sprengstoffwesen, vol. 19, no. 5, May 1924, pp. 65-68, 20 figs. Discusses electric time-firing apparatus and firing of shot holes.

Liquid Air Blasting Process (Das Sprengluftverfahren), F. v. Rössing. Bauingenieur, vol. 5, no. 12, June 30, 1924, pp. 359-362, 6 figs. Discusses manufacture of liquid air, preparation and soaking of cartridges, electric shot firing, efficiency and economy of blasting.

Present Method of Liquid Air Blasting in Germany (Das gegenwärtige Sprengluftverfahren in Deutschland), A. Stettbacher. Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 19, no. 9, Sept. 1924, pp. 129-136, 21 figs. Discusses liquid-air plants, vessels for transportation, cartridges, shot firing, accidents, etc.

Liquid-Oxygen. Economical Liquid Oxygen Blasting, F. W. O'Neil. Cement & Eng. News, vol. 36, no. 8, Aug. 1924, pp. 19-20 and 42-43, 7 figs. Two successful demonstrations in Pennsylvania quarry show value of new explosive.

Liquid-Oxygen Explosives in Epoch-Making Blast, F. W. O'Neil. Compressed Air Mag., vol. 29, no. 7, July 1924, pp. 913-916, 8 figs. 4500 tons of rock lifted in Pennsylvania quarry with less than 800 lb. of new explosive.

The Effect of the Temperatures of Liquid Oxygen Explosives on Cordeau-Bickford, D. B. Gawthrop. U. S. Bur. Mines—Reports of Investigations, serial no. 2619, June 1924, 5 pp. Results of experiments show that Cordeau-Bickford can be used with liquid oxygen as with other explosives.

Methods. Blasting as a Fine Art, W. Weiss. Explosives Engr., vol. 2, no. 9, Sept. 1924, pp.

306-308, 7 figs. Describes three examples of problems the explosives engineer is called upon to solve, viz., blasting of stone bridge situated close to occupied houses, blasting of iron blocks for shipment, and quarry chamber shooting.

Quarry. Loading Well Drill Holes in Quarry Blasting, J. B. Stoneking. Rock Products, vol. 27, no. 18, Sept. 6, 1924, pp. 33-35, 1 fig. Describes how to compute drill-hole spacing, size and charge.

Record L. O. X. Blast at Pennsylvania Quarry, F. W. O'Neil. Eng. & Min. Jl.—Press, vol. 118, no. 1, July 5, 1924, pp. 16-18, 3 figs. 4500 tons of rock were broken with 721 lb. of liquid oxygen explosive in 12 holes on 30-ft. bench.

The Largest Blast Ever Made in America, H. Petersen. Explosives Engr., vol. 2, no. 4, Apr. 1924, pp. 115-117, 5 figs. Methods followed in blast made at Lakeside quarry of Southern Pacific Railroad Co., 47 miles west of Ogden, Utah; satisfactory results accomplished at low cost.

World's Record Quarry Blast! Rock Products, vol. 27, no. 10, May 17, 1924, pp. 21-25, 12 figs. Notes regarding largest non-accident dynamite explosion in world which was carried out at million-dollar crushed stone quarry of Blue Diamond Co., in Hoag's Canyon, near Corona, Cal., to reduce menace of high cliffs to quarry operations and obtain a maximum volume of rock in a single shot for commercial purposes. 182 tons of explosives yielded 2,000,000 tons of rock.

Safe Firing of Charges. The Safe Firing of Blasting Charges in an Inflammable Atmosphere, E. Audibert. Colliery Guardian, vol. 128, nos. 3333 and 3335, Nov. 14 and 28, 1924, pp. 1251-1252 and 1374-1375, 6 figs. Nov. 14: Mechanism of explosive reactions; detonation of nitroglycerine. Nov. 28: Gases produced by detonation; mechanism of decomposition; application of results. Translated from Industrie Minérale.

Shales. Proper Blasting Procedure, E. Godfrey. Contract Rec. & Eng. Rev., vol. 38, no. 8, Feb. 20, 1924, pp. 179-180. How to drill and shoot holes in shale that is too hard for easy digging; correct arrangement of holes.

Tunnels. Delay Electric Blasting Caps in Tunnel-Driving, L. R. Watts and W. R. Ellis. Explosives Engr., vol. 2, no. 8, Aug. 1924, pp. 259-265, 13 figs. Describes methods developed during past five years in Sierra Nevada mountains.

BLEACHING

Ozone in. See OZONE, Industrial Application.

Process. The Bleaching Process (Ueber den Bleichvorgang), P. Waentig. Zeit. für angewandte Chemie, vol. 37, no. 8, Feb. 21, 1924, p. 97. Author considers explanation put forward by Schwalbe and Wenzl to account for greatly increased rate of bleaching obtained when nitrogen or air-free carbon dioxide is passed through material under treatment is insufficient, and process appears to need further investigation.

BLEACHING POWDER

Explosions. Bleaching Powder Explosions, A. H. Gill. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 577-578. Investigation of cause of explosions shows that oxygen is evolved from bleaching powder under ordinary commercial conditions in 12-oz. cans and larger air-tight packages, in quantities sufficient to produce serious explosions.

BLOWERS

Blast-Furnace, Reconstruction of. Reconstruction of Blast-Furnace Blowing Engines, W. Benedict. Powder, vol. 60, no. 8, Aug. 19, 1924, pp. 290-291, 4 figs. By substitution of plate spring valves for heavy rotary valves and gearing, speed was increased from 75 to 95 r.p.m. and capacity correspondingly increased on six 3200-hp. twin blowing engines.

Diesel-Engine Scavenging. See DIESEL ENGINES, Scavenging Blowers for.

Mine Ventilation. Symposium: Mine Ventilation, S. de Smidt and H. Pirow. Chem., Met. & Min. Soc. S. Africa—Jl., vol. 24, no. 9, Mar. 1924, pp. 213-223 and (discussion) 224-228, 7 figs. Notes on Venturi blowers.

Regulations. Report of Committee on Blower Systems. Nat. Fire Protection Assn.—Advance Publication, 1924, 13 pp., 6 figs. Regulations for installation of blower and exhaust systems for heating and ventilating systems, systems for removal of flammable vapors, and stock and refuse-conveying systems, presented for final adoption.

Turbo. Turbo-Blowers for the New Royal Dutch Works, P. Ostertag. Iron & Coal Trades Rev., vol. 108, no. 2917, Jan. 25, 1924, pp. 133-134, 7 figs. Describes construction and enumerates results of tests carried out on one of three blast-furnace blowers delivered by Escher, Wyss & Co., Zurich, Switzerland, to order of Kon. Ned. Hoogovens & Staalfabricken at The Hague. Translated from Schweizer Bauzeitung.

BLUEPRINTS. See DRAWINGS, Blueprint System.

BOARDWALKS. See BEACHES, Coney Island, N. Y., Improvements.

BOAT LIFTS. See CANALS, Boat Lifts.

BOATS

[See also SHIPS.]

River. River Boats for Internal Navigation in Italy (Barconi e rimorchiatori per la navigazione interna in Italia), A. Bassi. Ingegneria, vol. 3, no. 7, July 1, 1924, pp. 228-234, 3 figs. Details of design and construction of boats, barges, etc., of 600 ton load, dimensions, equipment and cost of upkeep, transportation of freight, etc.

BOILER EXPLOSIONS

British Legislation. Steam Boiler Explosions. Colliery Guardian, vol. 128, no. 3324, Sept. 12, 1924, pp. 674-675. Abstract of memorandum prepared by C. E. Stromeyer, chief engineer of Manchester Steam Users' Assn. for Prevention of Steam Boiler Explosions, dealing exclusively with steam boilers clauses of new British Factories Bill.

Germany, 1922. Boiler Explosions in Germany during 1922 (Die Dampfkesselzerknalle im Deutschen Reiche während des Jahres 1922 mit einem Nachtrage des Jahres 1921). Zeit. des Bayer. Revisions-Vereins, vol. 28, no. 1-2, Jan. 31, 1924, pp. 4-7. Statistical data on nature and causes of explosions, including report on one explosion which occurred in December, 1921.

Locomotives. Boiler Explosion Caused by Failure of Crown Sheet. Boiler Maker, vol. 24, no. 3, Mar. 1924, pp. 76-78, 4 figs. Particulars regarding Chicago & North Western locomotive No. 2455 explosion at Belle Plaine, Iowa, July, 1923; indicates importance of equipping boilers with water columns to check water level.

Low Water Causes Fatal Crown Sheet Explosion. Boiler Maker, vol. 24, no. 5, May 1924, pp. 136-138, 3 figs. Report of Bur. of Locomotive Inspection investigation of A. T. & S. F. Locomotive 1455 disaster which occurred on Feb. 13, 1924.

Marine Boilers. Boiler Explosion on the Cross-Channel SS. "Engadine." Mar. Engr., vol. 47, no. 565, Oct. 1924, pp. 367-370 and 373, 2 figs. Extracts from report of formal investigation of Board of Trade into cause of accident, which occurred Apr. 11, 1924, in boiler room of vessel owned by South Ry. Co.

BOILER FEEDWATER

Air Separator. The Hickman Air Separator. West. Machy. World, vol. 15, no. 1, Jan. 1924, p. 42, 1 fig. Describes simple mechanical device which extracts air bubbles from feedwater just after water has passed through feedwater heater, practically eliminating interior corrosion.

Analysis. Standard Methods of Water Analysis. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 559-561. Appendix E, report of Water Service Committee, Am. Ry. Eng. Assn., submitted for publication in manual. Covers only method of analysis directly applicable to boiler waters.

Circuits. See CENTRAL STATIONS, Boiler-Feedwater Circuits.

Concentration Control. Systematic Control of Boiler-Water Concentration, C. M. Ware. Power, vol. 60, no. 17, Oct. 21, 1924, pp. 650-651, 2 figs. Describes three methods, any one of which can be applied according to its relative merit for plant concerned.

Conditioning. The Prevention of Scale Formation by Boiler Water Conditioning, R. E. Hall, C. Fischer and G. W. Smith. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 312-327, 18 figs. Discusses conditioning of boiler water based on sulphate concentration and pressure of boiler water, removal of precipitated sludge and suspended insoluble matter, prevention of droplets (moisture) entrained in steam.

Examination. The Necessity of Testing Purified Boiler Feedwater (Ueber die Notwendigkeit der Prüfung des gereinigten Kesselspeisewassers), Schweisgut. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 10, May 31, 1924, pp. 83-85. Practical examples are cited to show purpose and necessity of feedwater examination.

Feed Regulation. Boiler Feed-Water Regulation. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 44-51, 6 figs. Describes several designs of regulators.

Foaming. Foaming of oiler Water, C. W. Foulk. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1121-1125. Advances theory according to which soluble salts in water, by creating difference in concentration between surface and mass of liquid, make possible formation of films; experiments with various mixtures in flasks showed no exceptions to this theory.

Heaters. See FEEDWATER HEATERS, Locomotive.

Heating. Savings Effected by Heating Boiler Feed Water, W. A. Taller. Nat. Engr., vol. 28, no. 7, July 1924, pp. 322-324. Value of feedwater heaters and economizers in utilizing waste heat.

See also Regenerative Feed Heating.

Heating by Extraction. Economy Characteristics of Stage Feedwater Heating by Extraction, E. H. Brown and M. K. Drewry. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 118-122, 5 figs. Authors point out influence of each possible factor in computations, present practical method for computing extraction cycles, and deal with various factors affecting turbine-room economy. (Abridged.)

Economy Secured by Heating Feed Water, C. E. Colborn. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 946-947, 3 figs. Recent practice has shown that improvement in plant economy can be obtained by feedwater heating with bled steam.

The Heating of Boiler Feedwater by Means of Steam Extracted from the Turbine (Réchauffage de l'eau d'alimentation de la chaudière au moyen de vapeur extraite de la turbine), A. Schlag. Revue Universelle des Mines, vol. 67, no. 1, Jan. 1, 1924, pp. 7-18, 6 figs. Calculation of actual saving of heat effected by this method.

Measurement. Measuring the Feed Water in a Boiler Test, J. W. Gavett, Jr. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 567-568, 3 figs. Discusses arrangement of apparatus for measuring feedwater; necessary apparatus; best method of computing quantity of water from readings of head.

Oil Removal. Purification of Feed Water Containing Oil, C. E. Joos. Power Plant Eng., vol. 28, no. 24, Dec. 15, 1924, pp. 1244-1247. Sources of contamination; effect of foaming and priming; corrosion; methods of detection and estimation; methods of elimination.

Removal of Oil from Condensate, A. E. Walden. Power Plant Eng., vol. 28, no. 11, June 1, 1924, pp. 594-595. Tests indicate successful use of steam separators and filters in preparing condensate for boiler feed.

Pumps. See PUMPS, Boiler-Feed.

Regenerative Feed Heating. See SUPERHEATED STEAM, Regenerative Feed Heating by.

Regulators. Automatic Feed Water Regulation. Eng. & Boiler House Rev., vol. 38, nos. 1, 3, and 5, July, Sept., and Nov. 1924, pp. 14-18, 104-106, and 198, 201 and 203, 11 figs. Describes principal automatic regulators in use, and points out economic importance. Crosby feed regulator.

Mechanical Control of Boiler Feed Water, C. E. Wolff. Power Plant Eng., vol. 28, no. 5, Mar. 1, 1924, pp. 277-278, 4 figs. Points out that diverse demands of engineers in feedwater-regulation practice are being met by modern regulators, and sets forth requirements which must exist in regulators for effective results.

System, Sugar Refinery. Boiler Feed System in Sugar Refinery, Claude C. Brown. Power Plant Eng., vol. 28, nos. 8 and 9, Apr. 15 and May 1, 1924, pp. 428-431, 1 fig., and 482-485, 4 figs. Apr. 15: Analysis of feedwater and condensate return system; general layout of feedwater system; regulations. May 1: Freshwater make-up, storage systems, filters, softeners, testers.

Temperature, Increasing. Effect of Increased Feed Water Temperature, J. R. Darnell. Power Plant Eng., vol. 28, no. 2, Jan. 15, 1924, pp. 131-132. Boiler efficiency is not increased by raising feedwater temperature; effect is to give boiler less work to do.

Testing. Experiences in Checking Boiler Feedwaters (Erfahrungen bei der Kontrolle von Kesselspeisewässern), M. O. Wurmbach. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 14 and 15, July 31 and Aug. 15, 1924, pp. 123-126 and 135-138, 6 figs. During periodic examinations extending over months a periodic increase in hardness was found, caused by reabsorption of CO_2 on stoppage of boiler, which solved part of boiler scale to basic carbonate, mixing with water. Discusses methods for determining hardness and recommends that by Blacher for waters of unknown composition.

Treatment. Boiler Corrosion and the Treatment of Boiler Feed Water, A. Winstanley. Colliery Guardian, vol. 127, nos. 3289 and 3290, Jan. 11 and 18, 1924, pp. 90-91 and 158. Pitting; lime-soda process for pitting; general thinning; grooving, and other mechanical damage; treatment of boiler feedwater. From paper read before Past and Present Min. Students' Assn.

Boiler Feedwater (Kesselspeisewasser), Wimmelmann. Bergbau, vol. 37, nos. 8, 9 and 10, Apr. 17, May 1 and 15, 1924, pp. 141-144, 173-176, and 205-208, 8 figs. Describes in detail the various methods to prevent or remove boiler scale, also a number of devices used for this purpose.

Electrolytic Boiler Protection (Der Elektrolytkesselschutz), H. Manz. Wärme, vol. 47, nos. 28 and 29, July 11 and 18, 1924, pp. 325-327 and 338-340. Discusses results of experiments with Renger-Fuhrmann process on number of boiler plants showing that out of twenty cases only four were satisfactory. Suggests combination of electrolytic with chemical process.

Feed Water for Efficient Boiler Operation, M. F. Newman. Combustion, vol. 10, no. 1, Jan. 1924, pp. 39-40. A principle of treating boiler feedwater to reduce to a minimum difficulties arising from impurities in water.

Feed Water Treatment. Eng. & Boiler House Rev., vols. 37 and 38, nos. 8, 9 and 1, Mar., Apr. and July 1924, pp. 281-282, 323-324, and 5-7, 1 fig. Notes on recent papers read before Instn. Mech. Engrs. Boiler feedwater and scaling; present-day practice with lime-soda process; zeolite process.

Investigation of Boiler-Water Treatment, R. E. Hall. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 843-845, 2 figs. Boiler-water conditioning viewed from standpoint of chemical equilibria of inorganic salts; details of tests, 42 days with permanently hard water and 76 days of temporary hard water.

The Boiler-Water Problem, W. M. Booth. Power, vol. 60, no. 1, Sept. 9, 1924, pp. 410-412. Outlines in non-technical language some of the principal things engineer should consider in insuring a supply of suitable feedwater for his boilers.

The Chemistry of Interior Boiler Water Treatment, E. M. Partridge. Am. Water Wks. Assn.—Jl., vol. 12, no. 3, Nov. 1924, pp. 288-294. Cause and prevention of scale in steam boilers by use of compound.

The Cost of Boiler Feed Water, J. T. Beard, 2nd. Paper, vol. 33, no. 16, Feb. 7, 1924, pp. 5-7, 2 figs. Cost of impurities in boiler feedwater, and notes on methods of treatment, including softening.

The Scientific Treatment of Boiler-Water, Introducing the Colloidal Aspect, H. W. Bannister. North of England Inst. Min. & Mech. Engrs.—Trans., vol. 74, part 4, June 1924, pp. 113-120. Discusses problems and suggests remedies in treatment of feedwater; application of principles of colloid chemistry to feedwater treatment.

The Sphere of Boiler Compound—Colloid Chemistry and Scale Prevention, E. M. Partridge. Power, vol. 60, no. 2, July 8, 1924, pp. 56-59, 3 figs. Points out as erroneous the reasoning on which attitude that employment of boiler compound should be limited to treatment of water of but low degrees of hardness is based, and shows why hardest waters may sometimes be treated by boiler compound with better results than if an external method of treatment be adopted.

Use of Linseed as Water Softener (Emploi de la graine de lin comme anti-tartre), M. Courdurier. Chaleur et Industrie, vol. 5, no. 51, July 1924, pp. 325-329, 3 figs. Test carried out by French Navy; linseed is boiled in steam and used for reducing salt content of sea water; details of process and apparatus used.

Water Purification at the Gennevilliers Central Station (L'épuration de l'eau d'appoint à la Centrale de Gennevilliers), Chaleur et Industrie, vol. 5, no. 50, June 1924, pp. 277-279, 4 figs. Details of feedwater treatment and apparatus used, based on two years' practical working and giving entire satisfaction.

Water Treatment for Continuous Steam Production, R. E. Hall. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 810-817, 13 figs. Particulars regarding investigation in which water treatment is considered in its relation to prevention of scale formation, corrosion control, delivery of dry steam, and maintenance of minimum blow-down.

See also LOCOMOTIVES, Feedwater Treatment; WATER TREATMENT, Methods.

BOILER FIRING

Anthracite-Burning. Burning Anthracite in a Modern Steam Plant, E. E. Rowe. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 292-294, 4 figs. Shows special design of furnace at Amsterdam plant of Adirondack Power & Light Corpn. and gives results of series of boiler tests with anthracite.

Anthracite Slush. See STEAM POWER PLANTS, Anthracite-Slush-Burning.

Coal vs. Oil Fuel. Fuel Oil or Coal for Steam Generation, F. H. Daniels. Steam Coal Buyer, vol. 1, no. 2, Feb. 1924, pp. 11-15, 8 figs. Shows that fuel oil cannot compete with coal for generation of steam in land plants except for short periods of time.

Down-Draft Furnace. Firing a Hand-Fired Down-Draft Furnace, J. F. Barkley. U. S. Bur. Mines—Reports of Investigations, no. 2609, May 1924, 6 pp. Also Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 890-891. Method used and results obtained in testing a hand-fired down-draft furnace at a plant in Wash., D. C., in order to determine method of firing that would give best results with a minimum of smoke.

Excess-Air Calculation. Calculation of Excess Air, P. Verbeck. Combustion, vol. 10, no. 1, Jan. 1924, p. 61. Method of calculating excess air in boiler installations. Translated from Chemiker Zeitung, Aug. 9, 1923, pp. 681-682.

Flue-Gas Control. See FLUE-GAS ANALYSIS.

Gas. Gas Firing-Flame Control, A. C. Ionides, Jr. Gas Jl., vol. 166, no. 3179, Apr. 16, 1924, pp. 176-178 and (discussion) 178-179, 2 figs. See also Gas Wld., vol. 80, no. 2073, Apr. 12, 1924, pp. 334-336 and (discussion) 336-337, 1 fig. Author claims that principles of gas firing mostly employed hitherto are fundamentally wrong; discloses grounds for such a conclusion and establishes an alternative method.

See also Oil.

Lignite. Causes of Clinker Formation in Lignite Firing (Die Ursachen der Schlackenbildung bei der Braunkohlenfeuerung), F. Wirth. Wärme, vol. 47, no. 46, Nov. 14, 1924, pp. 541-542, 1 fig. Discusses ash ingredients and their melting point; melting point reduction of ash by complex compounds and fluxes; chloride, sulphate, alkalies and poor screening as causes of clinker formation.

Large Scale Firing with Crude Lignite (Grossfeuerungen für Rohbraunkohle), M. Pradel. Elektrotechnischer Anzeiger, vol. 41, nos. 121, 122-123, and 124, July 29, 31, and Aug. 2, 1924, pp. 641-642, 649-650, and 657-658, 11 figs. Discusses difficulties due to high water content, drying methods by means of flue gases; lignite furnace by J. A. Topf & Sons and its construction. July 31: Details of three tests carried out showing efficiency of 67 to 68 per cent. Aug. 2: Details of Aetna, Völker, and Ludwig Furnaces.

Refitting Central Heating Plants for Lignite Firing (Die Umstellung von Zentralheizungsanlagen auf die Verwendung von Rohbraunkohle),

Flügge. Deutsche Bauzeitung, vol. 58, no. 76, Sept. 20, 1924, pp. 159-160, 2 figs. Discusses increase of grate area to 3.5 times that for coke, drying and gasification of fuel, uniform and ample air supply, drawing ashes without disturbing fire, etc.

Lignite-Biquet. See HEATING, STEAM, Central.

Mixed. Boiler Operation with Coal-Dust Addition (Dampfkesselbetrieb mit Kohlenstaub-Zusatzfeuerungen), G. Maas. Archiv für Wärmewirtschaft, vol. 5, no. 8, Aug. 1924, pp. 151-152, 4 figs. Discusses pulverized-coal firing used in addition to regular coal firing for equalizing load fluctuations of boiler and gives example of such secondary dust firing with vertical boiler of 500 cu. in.

Oil. Burning Oil and Gas Under Steam Boilers. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 12-28, 37 figs. Coal versus fuel oil; oil-burning systems; types of burners and their application to boiler furnaces; operating data.

Oil Firing of Steam Boilers, F. Dawson. Eng. & Boiler House Rev., vol. 37, no. 7, Feb. 1924, pp. 226, 228, 230 and 232, 10 figs. Deals with fundamental economic factors in order to show advantages which oil firing offers steam user.

Pulverized-Coal. See PULVERIZED COAL, Boiler Firing.

Refuse. Refuse Power Plants and Steam Production From Refuse (Müllkraftwerke und Dampferzeugung aus Müll), A. Reich. Städtereinigung, vol. 16, no. 19, Oct. 1, 1924, pp. 177-182, 6 figs. Describes Berlin-Schöneberg power plant, firing refuse with an addition of coal; cascade grate of Vesuvio A. G. for low-grade fuels; table of tests with various kinds of fuel.

Wet Fuel. High-Pressure Steam and Boiler Firing With Special Reference to Wet Fuel (Hochdruckdampf und Kesselfeuerung unter besonderer Berücksichtigung der nassen Brennstoffe), D. J. Hudler. Feuerungstechnik, vol. 13, no. 2, Oct. 15, 1924, pp. 9-14, 3 figs. Discusses predrying of fuel by means of flue gases as most favorable, and gives calculations for lignite and peat.

BOILER FURNACES

Air Infiltration Losses. The Magnitude and Prevention of Air Infiltration Losses in Power Plants, C. H. S. Tupholme. World Power, vol. 2, no. 12, Dec. 1924, pp. 348-351. Gives list of causes to which furnace air-infiltration losses are usually due; methods of preventing furnace air leaks.

Air Preheaters. Air Preheaters and Their Application. Power, vol. 60, no. 23, Dec. 2, 1924, pp. 884-889, 10 figs. Summary of conditions which lead to interesting sidelights on preheating of air; describes types of air preheaters.

Experiments on a Cylindrical Steam Boiler with and without Preheated Air, W. H. Owen. Inst. Mar. Engrs.—Trans., vol. 36, June 1924, pp. 1-37, 12 figs. Discusses preheating air of combustion; describes new form of preheater extracting 65 to 70 per cent of heat in waste gases, and tests made.

Ljungström's Preheater (Ljungströms Luftforvarmer), J. F. Johansen. Ingeniören, vol. 33, no. 28, July 12, 1924, pp. 329-333, 9 figs. Device for continuous transmission of heat of combustion product to fresh air on its way to combustion chamber. Superiority of this device as compared to economizer is emphasized.

The Ljungström Air Preheater, B. G. Brolinson. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 351-358 and (discussion) 358-360, 22 figs. Discusses application of this preheater based on principle of carrying heat continually in mechanical way from flue gases to incoming air, apparatus being self-contained, compact in design, simple in operation and permits of ready application.

The Preheating of Combustion Air, J. B. Bullock. So. African Inst. Elec. Engrs.—Trans., vol. 15, part 5, May 1924, pp. 388-396, 4 figs. and (discussion by W. H. Badger, part 8, Aug. 1924, pp. 437-438). Describes latest system of recovering and putting to beneficial use maximum amount of heat available in coal as fired to boiler or furnace, and gives some account of results obtainable with system and of their bearing on present boiler practice.

The Preheating of Combustion Air (Sur le préchauffage de l'air de la combustion), Ch. Roszak. Chaleur & Industrie, vol. 4, no. 43, Nov. 1923, pp. 825-834, 8 figs. Discusses problems and results, advantages and disadvantages of process, and design of air heaters.

See also Design.

Air Preheating for. Air Preheating, F. Dawson. Eng. & Boiler House Rev., vol. 37, no. 8, Mar. 1924, pp. 274-276, 5 figs. Brief review of present state of development.

Boiler-Test Results with Preheated Air, C. W. E. Clarke. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 64-72, 10 figs. Data on elaborate tests recently carried out on units of Colfax station of Duquesne Light Co., showing that efficiency of unit is increased from 5 to 7 per cent by use of preheater. (Abstract.)

The Preheating of Combustion Air (Le préchauffage de l'air de la combustion), Roszak. Société des Ingénieurs Civils—Mémoires et Compte Rendu des Travaux, vol. 76, no. 10-12, Oct.-Dec. 1923, pp. 1145-1170, 8 figs. See also Chaleur & Industrie, vol. 5, no. 46, Feb. 1924, pp. 66-70. Study of question as to whether preheating of air of combustion offers same advantage when applied to evaporators as to metallurgical furnaces; derivation of calorific equation and analytical relation between preheating of air and increase of combustion temperature; advantages and disadvantages of process.

The Use of Preheated Air and Exhaust Gases for Boiler Furnaces (Ueber die Verwendung von vorgewärmter Luft und von Abgasen für Kesselfeuerungen), W. Deinlein. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 5, Mar. 15, 1924, pp. 29-33. Numerical determination of furnace and waste-gas temperatures, fuel consumption, etc., when heating with crude lignite, Bavarian and Ruhr coal.

Anthracite, Dust and Small-Sized. Furnaces for Burning Small Sizes of Anthracite, A. R. Mumford. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 138-142, 7 figs. Design as indicated by results of systematic investigation of furnace of water-tube boiler of 10,000 sq. ft. heating surface, fired by two chain-grate stokers. (Abridged.) See also Power, vol. 59, no. 8, Feb. 19, 1924, pp. 284-287 and discussion by A. A. Cary, no. 9, Feb. 26, 1924, pp. 326-328, 3 figs.

New Furnace Solves Problem of Burning Anthracite Dust, C. H. S. Tupholme. Coal Age, vol. 25, no. 5, Jan. 31, 1924, pp. 175-176, 4 figs. Difficulty in ignition and tendency to clog air passages overcome; piles at Welsh pits hitherto considered only waste now valuable.

Arches. Flat Furnace Arches. Eng. & Boiler House Rev., vol. 38, no. 6, Dec. 1924, pp. 243-244 and 246, 3 figs. Principal features of flat suspended arch in comparison with ordinary sprung arch for boiler furnaces.

Suspended Arches Gaining in Favor. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 38-41, 10 figs. Proper ignition and combustion de-

mand careful consideration of arch design; construction details.

Combustion Control. Control of Combustion Processes in Furnaces (Excess Air and Efficiency) [Beurteilung und Kontrolle der Verbrennungsvorgänge bei Feuerungen (Luftüberschuss und Leistung)], A. Dosch. Feuerungstechnik, vol. 12, nos. 13 and 14, Apr. 1 and 15, 1924, pp. 107-109 and 116-117, 9 figs. Control device for excess air and stress; scale diagrams.

Controlling Combustion by Temperature, G. Simmons. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 906-908, 4 figs. Furnace and exit gas temperatures control dampers and fuel feed through thermocouples.

Design. Furnace Construction. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 35-37, 4 figs. Notes on proportions, special baffling, arches and linings.

Problems in Boiler Furnace Design, E. B. Ricketts. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 473-476, 5 figs. Changes in stoker design, high ratings, high capacities, etc.; value of air heaters; materials for furnace-wall construction; effect of high combustion efficiency on superheat; mixing of boiler-furnace gases.

Stokers and Furnaces. Nat. Elec. Light Assn.—Serial Report of Prime Movers Committee, Aug. 1924, 45 pp., 70 figs. See also (abstract) Combustion, vol. 11, no. 5, Nov. 1924, pp. 372-377, 8 figs. Developments during year; test data on three furnace air preheaters; mixing of gases in boiler furnaces; water-cooled and air-cooled furnace walls; rate of coal burning on various types of stokers; furnace construction; tests of refractories as to size and physical characteristics. Manufacturers' statements.

See also COAL, Low-Grade and Waste.

Draft. Artificial Draft and Its Application (Künstlicher Zug und dessen Anwendung), E. Blau. Brennstoff- u. Wärmewirtschaft, vol. 6, no. 12, Nov. 1924, pp. 243-248, 2 figs. Reduction of resistances in flue-gas channels; forced draft arrangement of boiler plants; gives examples.

Draught and Its Effects on the Working and Efficiency of Boilers, J. T. Ruddock. Eng. & Boiler House Rev., vol. 37, no. 8, Mar. 1924, pp. 279-281, 1 fig. Deals with plants working with induced or chimney draft only; shows necessity for securing necessary draft pressure in combustion chamber itself. From paper read before Elec. Power Engrs.' Assn.

Dutch Ovens for Bagasse. Dutch Ovens for Bagasse, J. O. Frazier. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 682-683, 3 figs. Practical experiences with three types of settings; Dutch oven with auxiliary combustion chamber gave best results; formation of "moss" on roofs and walls of Dutch ovens.

Electric Waste-Gas Cleaning. The Elimination of Chimney Discharges by Means of Electric Gas Cleaning (Die Beseitigung des Schornstein-Auswurfs mittels elektrischer Gasreinigung), H. Schroeder. Feuerungstechnik, vol. 12, nos. 9 and 10, Feb. 1 and 15, 1924, pp. 65-66 and 73-77, 7 figs. Losses through soot, coke- and flue-dust particles, and their removal by means of flue-dust separators; describes Oski process and installation for gas cleannig and dust removal; its advantages, working costs, arrangement, and useful scope.

Firing. See BOILER FIRING.

Forced-Draft. The Burning of Colliery Refuse Fuels. Colliery Engr., vol. 1, no. 3, May 1924, pp. 148-149, 4 figs. Describes important modification of turbine forced-draft furnace.

Gas-Fired. Combustion in Gas-Fired Boiler Furnaces, Heat Transmission in Refractory Brick, and the Problem of Heat-Storage Linings (Ueber die Verbrennung in Gasbrennern, den Wärmeübergang an feuerfesten Stein und über die Frage der Wärmespeicherausmauerung), H. Lent. Wärme, vol. 47, nos. 3, 4 and 5, Jan. 18, 25 and Feb. 1, 1924, pp. 24-26, 33-37 and 45-49, 18 figs. Describes experimental pipe section for investigating phenomena in furnace and in combustion chamber in the burning of blast-furnace gas under different conditions; also temperature along pipe section and heat-transmission conditions.

German. Recent Developments in German Furnace Construction for Steam Boilers (Die neuere Entwicklung des deutschen Feuerungsbaues für Dampfkessel), H. Franke. Archiv für Wärmewirtschaft, vol. 5, no. 7, July 1924, pp. 121-126. Discusses developments before, during, and after war, lignite firing, pulverized-coal firing, etc.

Grates. Rocking and Dumping Grates. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 44-47, 11 figs. Principles of operation with general description and details of makes.

Stationary, Shaking, Dumping Grates and Hand Stokers. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 64-74, 24 figs. Points to be remembered when selecting a grate; adaptability of various designs, how they are handled and their application to boiler furnaces.

Grates, Clinker Dam for. New System of Clinker Dam for Grates Using a Movable Ash Door, W. Lulofs. Elec. Times, vol. 65, no. 1705, June 19, 1924, pp. 721-723, 6 figs. Describes adjustable clinker dam system of Du Croo and Brauns and its advantages.

Ground Firebrick for Repair. Ground Firebrick for Furnace Repair, Jos Harrington. Power, vol. 59, no. 25, June 17, 1924, pp. 976-978, 10 figs. Results from experience with special bond made principally from old firebrick for laying up new walls and of mortar for facing or patching; thick joints of this bond show saving of 35 per cent over thin cement joint construction.

Induced-Draft Installations. Calculation of Induced-Draft Installations (Berechnung einer Saugzug-Anlage), H. R. Karg. Fördertechnik u. Frachtverkehr, vol. 17, no. 6, Mar. 20, 1924, pp. 76-79. Calculation of induced-draft plant and auxiliary exhauster; determination of excess air.

Develops New System of Induced Draft. Mar. Rev., vol. 54, no. 11, Nov. 1924, pp. 422-424, 3 figs. Details of system developed by German engineer Hans Haas. Gases are forced up and out of stack, thus increasing air suction in furnace, accomplishing by artificial means much same effect as that due to provision of suitably high chimneys for stationary plants.

Lignite. Improvements in the Construction of Lignite Furnaces (Neue Wege im Bau von Braukohlen-Grossfeuerungen), Pradel. Feuerungstechnik, vol. 12, no. 15, May 1, 1924, pp. 121-126, 7 figs. Extension grates and furnaces; drying on grate; drying in shaft in self-feed furnace with trough grate; step-grate half-gas furnaces; extension drying shafts; arrangements for low-temperature-tar production.

The Vesuv and Aetna Half-Gas Furnaces for Lignite (Die Halbgas-Grossfeuerungen Vesuv und Aetna für Rohbraunkohle), Pradel. Wärme- u. Kälte-Technik, vol. 26, no. 22, Nov. 15, 1924, pp. 205-207, 5 figs. Design and construction of furnaces built by Adler & Henszen; mechanical stoking and hand firing.

Linings. Boiler Furnace Economies, W. H. Gaylord, Jr. Ariz. Min. Jl., vol. 7, no. 16, Jan. 15, 1924, pp. 30-32, 5 figs. How old linings are used for repairs and reconstruction.

Fire Brick Lining for Combustion Chambers, R. June. Gas Age-Rec., vol. 53, no. 14, Apr. 5,

1924, pp. 426-428, 6 figs. Firebrick furnace wall construction; notes on quality of brick.

Improvements in Furnace Lining Material. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 41-42, 2 figs. Methods used to reduce maintenance cost of linings.

Plastic Material for Lining Boiler Furnaces. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 9-11, 6 figs. Application of plastic materials for complete lining of new furnaces, facing of bridgewall and arches in Dutch-oven furnaces, making or lining of fire-door arches and rear arch for return tubular boilers, and baffles for all forms of water tube boilers, as well as repairing of these parts.

Reducing the Cost of Relining Boiler Furnaces. Power, vol. 59, no. 26, June 24, 1924, pp. 1028-1030, 5 figs. Most successful and economical lining material has been found to be combination of crushed used firebrick, fireclay and sodium silicate (water glass) applied by means of air gun in form of spray.

Low-Grade Fuel. Heat Generation and Heat Balances of Furnaces, Especially for Low-Grade Fuels (Wärmeerzeugung und Wärmebilanzen von Feuerungen, besonders für minderwertige Brennstoffe), Fr. Ebel. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 39 and 42, Sept. 27 and Oct. 18, 1924, pp. 1031-1036 and 1106-1108, 34 figs. Points out that method of calculating chimney losses and losses due to unburned gases depends to great degree on extent of carbon losses; new method of determining actual losses and plotting correct heat balances graphically; suggestions for firing of low-grade fuels and application of same method to gas furnaces.

Investigation of Chain Grates and Ignition Arches for Low-Grade Fuels (Untersuchungen an Wanderrosten und Zündgewölben für minderwertige Brennstoffe), F. Ebel. Glückauf, vol. 60, nos. 25, 26, and 27, June 21, 28, and July 5, 1924, pp. 507-516, 541-544, and 561-566, 27 figs. Gives results of 3 series of experiments for evaporation tests, analysis of fuel, heat balance, fluegas analysis; tables of observed and calculated data; conclusions as to requirements of boiler plant firing low-grade fuel.

Low-Temperature-Tar Plant. Boiler Furnace with Low-Temperature-Tar Recovery Plant (Dampfkesselfeuerung mit Urteergewinnungsanlage). Wärme- u. Kälte-Technik, vol. 26, no. 5, Mar. 1, 1924, pp. 33-35, 4 figs. Grate furnace with distillation shaft installed in front for production of low-temperature tar from combustion gases of boiler furnaces, according to process developed by B. Meyer; advantages of system.

Oil-Fired. Burning Oil Under Power Boilers, R. F. Burke. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 328-330, 3 figs. Points out that localization of heat in furnace must be avoided if brickwork and boiler maintenance are to be kept low; flame impingement causes tube failures; short flame may result from high per cent of excess air.

Efficiency in Oil Burning Installations, F. A. Rothwell. Power Plant Eng., vol. 28, nos. 10 and 12, May 15 and June 15, 1924, pp. 526-528 and 639-641, 3 figs. May 15: Furnace design and location of burners. June 15: Selection of burners; method of supplying fuel to burners; necessary auxiliary equipment; operation of fuel-oil-burning furnace.

Furnace Design Important in Burning Oil. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 63-66, 11 figs. Furnace volume and amount of combustion air important factors; types of oil burners.

Use of Oil Firing (Die Verwendung von Oelfeuerungen), G. Spettmann. Praktische Maschinen-Konstrukteur, vol. 57, no. 36, Sept. 23, 1924, pp. 495-496, 4 figs. Discusses advantages of oil firing and furnaces, furnace operation, atomizers, burners, and gives examples of application.

Operation. The Control of Power Production, C. L. Hubbard. Factory, vol. 33, no. 3, Sept. 1924, pp. 350-354, 15 figs. What it pays to know about boiler furnaces.

The Economical Operation of Boiler Furnaces, R. June. Power House, vol. 17, no. 9, May 5, 1924, pp. 21-22, 5 figs. Stresses fact that development of flat suspended arch has been an important factor in reducing maintenance costs.

Pedagogical Systematizing. The Pedagogical Systematizing of Furnace Equipment (Die Pädagogische Systematisierung der feuerungstechnischen Einrichtungen), C. Blacher. Feuerungstechnik, vol. 12, no. 11, Mar. 1, 1924, pp. 81-84, 2 figs. Points out necessity of pedagogical development of technical studies through introduction of easily understood general aspects; aim of engineering is development of uniform, continuous, and, so far as possible, automatic processes, without too great regard to complicity of apparatus; systematizing of boiler furnaces and gas producers, based on this viewpoint.

Refuse-Burning. See FUELS, Factory Refuse.

Smoke Preventer. An Automatic Smoke Preventing Apparatus. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 27-28, 3 figs. Device for prevention of smoke from Lancashire and Cornish-type boilers.

Stokers. See STOKERS.

Turbine. The Modern Turbine Furnace. Eng. & Boiler House Rev., vol. 37, nos. 5 and 6, Dec. 1923, and Jan. 1924, pp. 149-150 and 152 and 198-200, 8 figs. Scientific principles underlying design and working of most modern type of steam jet furnace as represented by installation of Turbine Furnace Co., Ltd., London.

The "Turbine" Forced Draught Furnace. Electrician, vol. 92, no. 2386, Feb. 8, 1924, p. 164, 2 figs. Description of a steam jet furnace made by Turbine Furnace Co., employing low-grade fuel.

Walls, Reconstruction of. Reconstruction of Boiler Furnace Walls. Elec World, vol. 84, no. 25, Dec. 20, 1924, pp. 1312-1313, 1 fig. Complete side-wall and front-wall patches, using crushed linings from old furnaces as refractory base, are being successfully used on oil-burning boiler furnaces at Glenwood power station of N. Y. Central R. R. Co.

Water-Cooled. The "Murray" Water-Cooled Furnace Wall, D. Brownlie. Elec. Times, vol. 66, no. 1721, Oct. 9, 1924, pp. 413-415, 3 figs. Describes water-cooled steel-tube furnace wall for operation with water-tube boilers and any type of mechanical stoker.

Water-Cooled Furnaces Make Records at Hell Gate, W. E. Caldwell. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 354-358, 6 figs. Side walls made of 4-in. tubes with overlapping fins; furnace deterioration greatly reduced; combined efficiency of 92.7 per cent obtained.

Water-Tube Boilers. Precautions Necessary in Installing Furnaces of Water-Tube Boilers and Closing Them (Quelques précautions nécessaires à observer dans l'installation des fourneaux de chaudières aquatubulaires et de leurs fermetures), M. L. Bochet. Annales des Mines, vol. 6, no. 7, July 1924, pp. 32-50, 1 fig. Details of number of boiler accidents, explaining faulty construction.

Wood-Waste-Burning. Furnaces for Burning Wood Refuse. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 68-70, 7 figs. Difficulties encountered in burning refuse from woodworking plants and principles governing furnace design.

BOILER HOUSES. See BOILER ROOMS; BOILER PLANTS.

BOILER OPERATION

Combustion Control. Combustion Control for Boilers, R. J. S. Pigott. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 590-592, 1 fig. See also Combustion, vol. 10, no. 6, June 1924, pp. 432-436; Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 694-695, 2 figs.; and Paper, vol. 34, no. 9, June 19, 1924, pp. 368-371. Functions involved in operation; possibilities and methods of regulation; design, insulation; human factor in system.

Electrical System of Combustion Control for Boiler Plants. Power, vol. 59, no. 2, Jan. 8, 1924, pp. 46-48, 4 figs. Boilers automatically controlled by master regulator at throttle valve, which adjusts voltage of exciter generators connected to field windings of stoker, forced- and induced-draft fan motors.

See also CENTRAL STATIONS, Combustion Control; COMBUSTION, Control.

Combustion Problems Calculation. The Relation of Ash Pit Loss to Flue Gas Analysis, R. Brown. Combustion, vol. 10, no. 6, June 1924, pp. 436-438, 2 figs. Two charts which furnish short-cuts in boiler calculations.

Control. Control of Boiler Room Operation, E. G. Bailey. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1095-1097, 4 figs. Outline of instrument and control application.

Modern Systems of Boiler Control, J. B. C. Kershaw. Engineer, vol. 137, no. 3554, Feb. 8, 1924, pp. 141-144, 5 figs. Bonus systems in the boiler house and how they are applied in certain British industrial and power plants; a German scheme of bonus payments; an American method of control.

Scientific Control of Steam Generation in Factories, H. S. Rowe. Mech. World, vol. 76, nos. 1976, 1977, and 1978, Nov. 14, 21, and 28, 1924, pp. 315-317, 332-333, and 348-349, 2 figs. Shows that application of principles of scientific control to continuous working under every-day conditions may be made to give results in keeping with high standard stated to be possible.

Costs and Economies. Boilers—Operation Cost and Economies, J. A. Whitlow. Elec. Light & Power, vol. 2, no. 10, Oct. 1924, pp. 18-19, 80, 82, and 84. Notes on grate area; kinds of grates and furnaces; feedwater heaters; economizers; superheat; and operating data.

Draft Regulation. The Craig System of Better Draft Control. Steam Power, vol. 2, no. 12, Jan. 1924, pp. 7 and 10, 1 fig. Describes Craig regulator and its operation; automatically maintains a constant over-fire draft by controlling position of uptake damper.

Efficiency. Boiler-House Efficiency, Jas. T. Beard, 2nd. Power, vol. 59, no. 5, Jan. 29, 1924, pp. 168-170. Points out that high CO_2 is only one element of high overall efficiency; consideration must also be given to loss of fuel through grate, incomplete combustion and poor heat absorption due to soot, scale and leaky baffles.

Economy in the Generation and Utilisation of Steam, Chas. F. Wade. Chem. & Industry, vol. 43, nos. 45 and 49, Nov. 7 and Dec. 5, 1924, pp. 1098-1100 and 1204-1207. Nov. 7: Desirable properties to be looked for when selecting suitable fuel for economical steam raising. Dec. 5: Boiler furnaces; fire grates; areas; air-supply arrangements; draft control; mechanical stokers.

Experiences and Requirements in Practical Boiler Operation (Erfahrungen und Forderungen des praktischen Kesselbetriebes), M. Guilleaume. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 9 and 10, Mar. 1 and 15, 1924, pp. 185-193 and 255-264, 57 figs. Experiences in field of boiler-plate testing; influences of design and construction; stresses in material through temperature changes during operation; observations on water circulation.

Increases in Boiler Efficiency, V. Z. Caracristi. Combustion, vol. 10, no. 1, Jan. 1924, pp. 32-36, 3 figs. How they should be considered in relation to other factors to obtain lowest cost per unit of boiler output; relationship of various factors can be determined by means of three carefully prepared charts (as ones illustrated).

Increasing Boiler Economy by Modern Methods, H. K. Blanning. Power Plant Eng., vol. 28, no. 24, Dec. 15, 1924, pp. 1236-1243, 6 figs. Describes work which has been going on at 60,000-kw. station at Lowellville, Ohio, with aim of increasing efficiency and of raising power-producing capacity without additional installation of boilers or generators; clear view of operating floor from control house; gages placed for guidance of fireman; records are posted on blackboard; steam pressure is maintained practically constant.

Influence of the Excess of Air on the Boiler Efficiency (Kedelvirkningsgradens afhaengighed af den til forbraendingen anvendte luftmaengde), K. Bak. Ingeniören, vol. 33, no. 26, June 28, 1924, pp. 311-315, 8 figs. Test results, illustrated by number of curves.

Operation of Steam Boiler Plants, E. B. Ricketts. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 749-751. Discussion of some of the more important factors which contribute to efficient boiler operation. Emphasizes fact that basis of good boiler operation is a thorough knowledge on part of all men in plant of materials and apparatus with which they must deal and thorough and consistent coöperation of management and men in common aim of stopping all leaks and keeping them stopped.

The Control of Power Production, C. L. Hubbard. Factory, vol. 33, no. 1, July 1924, pp. 26-29, 96, 98 and 100, 13 figs. Fundamental functions of a good boiler.

Excess Air, Effect of. Effect of Excess Air on Flue Temperatures and on Efficiency, A. K. Bak. Power, vol. 59, no. 17, Apr. 22, 1924, pp. 634-636, 8 figs. Variation in air quantity has direct effect upon mass of gas discharged and also gives rise to changes in flue-gas temperature; air quantity thus has important bearing on boiler losses and efficiency. Results of tests made at Connors Creek to establish relation between excess air and stack-gas temperature for particular boiler and setting.

Factors Influencing. Elasticity in Boiler-House Operation (Die Betriebelastizität im Kesselhausbetriebe), E. Bergmann. Feuerungstechnik, vol. 12, nos. 11 and 12, Mar. 1 and 15, 1924, pp. 84-86 and 98-100, 1 fig. Influence of different factors on boiler-house reserve, namely, fuels, boiler plant, boiler feed, waste heat and chimney.

Flue-Dust Removal. Boiler Flue Cleaning Plant. Engineer, vol. 137, no. 3567, May 9, 1924, p. 520, 2 figs. Apparatus in which partial vacuum is created by steam ejectors, but where that arrangement is not convenient, exhausters driven by any suitable means may be employed.

Flue Dust Removal Plant. Eng. & Boiler House Rev., vol. 38, no. 5, Nov. 1924, pp. 196 and 198, 1 fig. Describes simple and convenient method of removing flue dust from Lancashire boilers.

Fuel Economy in. See FUEL ECONOMY.

High Ratings. Boiler Operation at High Ratings, H. A. Reichenbach. Blast Furnace & Steel Plant, vol. 12, no. 8, Aug. 1924, pp. 354-359, 10 figs. Trumbull Steel Co. combines pulverized coal methods in power and heating furnaces; discusses pulverized-coal preparation plant; crushing

and raw-coal storage; drying; pulverizing; conveying; remote control for distribution system, etc.

Parsons' Line. Parsons' Line, E. K. Scott. Combustion, vol. 11, no. 3, Sept. 1924, pp. 207-211, 7 figs. Summary or controversy which has been going on regarding Parsons' Line (coal and water consumption per kw.-hr.), way it should be drawn, and its value. Includes report of interview with R. Parsons.

Rules for. Rules for Operating Steam Boiler Plants (Betriebsvorschriften für Dampfkesselanlagen), M. Guilleaume. Wärme, vol. 47, nos. 10 and 11, Mar. 7 and 14, 1924, pp. 97-99 and 107-110. Union of Large Scale Steam Boiler Users has collected operating rules among its members and examined them critically with result that legal regulations are found to require addenda, as well as rules of boiler manufacturers. Rules observed in individual boiler plants.

Sugar Factories. Sugar Industry and Modern Heat-Economy Methods (Zuckerindustrie und neuere Wärmetechnik), Berner. Wärme, vol. 47, nos. 46 and 48, Nov. 14 and 28, 1924, pp. 543-547 and 576-579, 19 figs. Discusses grates and pulverized-coal firing, decreasing waste-heat losses, advantages of central-power generation, choice of boilers, etc.; fluctuating losses and heat accumulators; steam pressure and boiler design.

BOILER PLANTS

[See also BOILER ROOMS.]

Ash Handling. See ASH HANDLING.

British Empire Exhibition, England. The Boiler House at the British Empire Exhibition, Wembley, London, J. D. Troup. Combustion, vol. 11, no. 1, July 1924, pp. 36-39, 5 figs. Description of boiler plant which is not only an exhibit of a number of different types of equipment, but actually furnishes power used at the Exhibition.

Wembley Boiler House. Eng. & Boiler House Rev., vol. 37, nos. 6, 7, 8, and 9, Jan., Feb., Mar., and Apr. 1924, pp. 191-193, 236-238, 284, and 316-318, 12 figs. Description of installations at British Empire Exhibition, Wembley. Jan.: Babcock & Wilcox boilers. Feb.: Installation by John Thompson Water-Tube Boilers, Ltd. Mar. and Apr.: Instruments for recording coal, water, and steam used, and for recording temperatures, draft, and flue-gas contents.

Chimneys. See CHIMNEYS.

Coal Handling. See COAL HANDLING, Power Plants.

Colenso, Africa. The Boiler House Plant at Colenso. So. African Power Engr., vol. 9, no. 75, July 1924, pp. 41-42, 1 fig. Design and equipment; eight boiler units; Babcock & Wilcox installation; chain-grate stokers; mechanical-draft system; compressed air and water service.

Economics. Boiler-House Economics (Die Wirtschaftlichkeit im Dampfkeseelhaus), O. Rühl. Wärme- u. Kälte-Technik, vol. 26, no. 18, Sept. 15, 1924, pp. 150-156, 20 figs. Discusses steam production and utilization, suitability of furnaces for fuels, types of grates and their operation, superheating, stacks, flue gas, heat recovery, etc.

Equipment. Boiler House Exhibits at Wembley. Eng. & Boiler House Rev., vol. 38, nos. 2, 3, and 5, Aug., Sept., and Nov. 1924, pp. 47-60, 109-111, and 184-185, 17 figs. Some recent developments in boiler-house equipment shown at Wembley Exhibition, London. Complete coal-handling plant at Wembley boiler house.

Increasing the Life of Equipment in Power Plants (Erhöhung der Lebensdauer maschineller Einrichtungen in Kraftanlagen), Braunkohle, vol. 23, no. 20, Aug. 16, 1924, pp. 382-392, 20 figs. Boilers and their safety, rules for acceptance tests, care of boilers, signs of wear, action of steam and pressure.

Flue-Dust Conveyors. Pneumatic Flue Dust Conveyors, K. Wagner. Eng. Progress, vol. 5, no. 4, Apr. 1924, pp. 61-64, 7 figs. Suction plant designed by Seck Bros., Dresden, erected in boiler room; experience gained in service.

Flue-Dust Separator. Flue Dust and Forced Draught. Engineer, vol. 137, no. 3573, June 20, 1924, p. 696, 3 figs. Describes "cindervane" fan for Stepney power house which combines dual functions of dust separator and induced-draft fan.

Fuel Economy. Fuel Economy in Steam Boiler Plants, Power Station Design and Operation, J. B. C. Kershaw. Power Engr., vol. 19, no. 224, pp. 411-413, 3 figs. Impartial examination of arguments for superpower stations.

Fuel Economy Questions, H. Womersley. Chem. & Industry, vol. 43, no. 28, July 11, 1924, pp. 715-718. Discusses calorific value of fuels, losses or efficiency of conversion, amount of steam delivered; also water treatment.

Specific Thermal Efficiency as a Measure of the Cost of Steam Production in a Boiler Plant (Der spezifische thermische Wirkungsgrad als Massstab für die Kosten der Dampferzeugung einer Kesselanlage), K. Deimler. Braunkhole, vol. 23, no. 34, Nov. 22, 1924, pp. 625-634, 4 figs. Graphic presentation of calorific value of fuels transmitted or converted to steam and determination, from this coal consumption and price of coal to produce steam, of condition obtaining at plant.

Instruments. Boiler and Turbine Room Instruments. Nat. Elec. Light Assn.—Serial Report (Prime Movers Committee), publication no. 24-84, Dec. 1924, 15 pp., 17 figs. Reports recent developments and describes new adaptations of older instruments; survey of CO_2 indicating and recording instruments and description of apparatus used for checking instruments; descriptions of types of operating-result reports and methods used to check operating performance by use of instruments were received from 32 companies and are summarized.

Boiler Room Instruments as an Aid to High Efficiency, E. G. Bailey. Nat. Engr., vol. 28, no. 12, Dec. 1924, pp. 591-595, 4 figs. Instrument readings showing operating conditions; advantages of steam-flow-air-flow method.

Boiler-Room Practice, J. Bruce. Elec. Rev., vol. 94, nos. 2414, 2515 and 2420, Feb. 29, Mar. 7, and Apr. 11, 1924, pp. 324-325, 365-367, 3 figs., and 564-566, 4 figs. Use of boiler-room instruments for efficient operation. Analysis of operating results.

Modern Boiler-room Instruments, J. Wolf. Combustion, vol. 11, no. 1, July 1924, pp. 40-42. Discussion of place held by instruments in modern boiler room and of particular functions and advantages of some of the more important types.

Iron and Steel Industry. The Generation and Utilization of Steam in the Iron and Steel Industry, J. A. Hunter. Mech. Eng., vol. 46, no. 6, June 1924, pp. 325-328 and 342, 3 figs. Equipment employed in iron and steel industry for generating and using steam; quantities and cost of fuel, and cost of converting heat in fuel to steam; present-day tendencies toward design and size of equipment, and refinements in control; describes two of latest installations; probable savings which could be made if all of steam required in industry were made and consumed in most efficient apparatus now in use.

Oil Refinery. New Vacuum Oil Co. Plant at Olean, N. Y. Illustrates Refinery Practice. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1082-1088, 10 figs. Central boiler plant of

5341 hp. capacity distributes steam to works; hot water from stills is treated in central water-treatment plant.

Remodeling. Remodeling a Large Boiler Room. Power Plant Eng., vol. 28, no. 4, Feb. 15, 1924, pp. 221-225, 11 figs. Replacement of old boilers at St. Louis pumping station and unusual engineering problems involved.

Smoke - Abatement Equipment. Manchester Smoke Abatement Exhibition. Eng. & Boiler House Rev., vol. 38, no. 6, Dec. 1924, pp. 231-236, 10 figs. Notes on boiler-house exhibits in relation to smoke abatement.

Steam Accumulators. See STEAM ACCUMULATORS.

BOILER PLATE

Alloy Steels for. Boiler Plate (Die Kesselbaustoffe), P. Goerens. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 3, Jan. 19, 1924, pp. 41-47, 11 figs. Deals with properties of unalloyed low-carbon steel and alloyed boiler plate at different temperatures, and influences of aging and recrystallization on these, which demonstrate advisability of using materials of higher limit of elongation, such as alloy steels; points out that boiler drums of maximum size and wall thickness can now be made of plain and alloy steels.

Punching and Shearing. Why A. S. M. E. Code Prohibits Punching and Shearing. Power, vol. 60, no. 25, Dec. 16, 1924, p. 982, 5 figs. Gives reasons for prohibiting of punching and shearing of boiler plates.

Strength of. The Distribution of Strength Properties in a Sheet-Iron Plate (Die Verteilung der Festigkeitseigenschaften innerhalb einer Blechtafel), E. Koch. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 3-4, 5 and 6, Feb. 29, Mar. 15 and 31, 1924, pp. 13-19, 33-38, and 44-47, 17 figs. Results of experimental investigation begun two years ago and still in progress; account of tests carried out in ammonia works of Dr. Wyszomirsky in Merseburg. Contains appendix, giving supplementary test regulations for boiler plate.

Testing. The Testing of Boiler Plates, Chas. L. Huston. Power, vol. 59, no. 21, May 20, 1924, pp. 820-822, 3 figs. Proposed revival of Tetmajer formula for using unit stresses instead of factor of safety in determining allowable stresses on steel boiler plate in construction of steam boilers and other pressure vessels.

BOILER ROOMS

Control. Measurement of Input and Output in Boiler Rooms, J. M. Spitzglass. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 299-309 and (discussion) 309-311, 11 figs. Shows how material quantities can be measured accurately and conveniently in steel-plant boiler rooms, including practical application of measuring flow of fluids and of coal; determination of constants.

Records and Efficiency at a London Power Station. Eng. & Boiler House Rev., vol. 37, no. 8, Mar. 1924, pp. 269-270 and 272, 4 figs. Notes on methods of boiler house control at Central Elec. Supply Co., Ltd., London.

To Regulate Fuel Expense, Control Draft, Jas. T. Beard. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 331-334, 6 figs. Points out that height of stack limits strength of draft; stokers are more efficient than grates; correctness of air supply indicated by CO_2 percentage.

Efficiency in. Boiler-Room Practice, J. Bruce. Elec. Rev., vol. 94, nos. 2424 and 2425, May 9 and 16, 1924, pp. 736-738 and 809-811, 3 figs. Furnace efficiency, excess air, and critical point of combustion.

Electric Drive. Motor Applications in the Boiler Room, H. W. Smith. Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 700-703, 6 figs. D. c. motors and control for stoker and clinker grinders; 2- and 4-speed squirrel-cage motors; wound rotor moters; forced- and induced-draft fans; boiler feed pump; coal-handling equipment.

Standardization of. Standardized Steam Generating Units, A. J. T. Taylor. Combustion, vol. 11, no. 1, July 1924, pp. 64-66. A plan suggested for purchase of boiler-room equipment as a complete unit.

BOILER TUBES

[See also TUBES, Charcoal-Iron.]

Expanding. Effective Expanding of Fire and Water Tubes in Boiler Heads (Befestigung und Haften von Heiz- und Wasserröhren in Kesselrohrwänden), O. Berndt. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 31, Aug. 2, 1924, pp. 809-810, 3 figs. Discusses various methods of fixing with special reference to increased boiler pressure; describes Steinmüller ball roller by which tubes can be expanded outside of wall.

Welding. See ELECTRIC WELDING, Boiler Tubes.

BOILERMAKING

Crown Stay Angles, Sine Determination. Method of Finding the Sines of the Angles Formed by Crown Stays, E. Hall. Boiler Maker, vol. 24, No. 3, Mar. 1924, pp. 80-81, 1 fig. Shows how sine of each of the different angles which crown stays make with vertical axis of boiler may be found and how to use value so found in formula where term $\xi \sin \alpha$ is used.

Drilling Machines for. See DRILLING MACHINES, Boiler-Shop.

Flanging Machine. Furnace Mouth Flanging Machine. Machy. (Lond.), vol. 23, no. 590, Jan. 17, 1924, pp. 521-523, 4 figs. Machine specially designed for flanging furnace mouths and manholes of marine boiler-end plates, which is used where ordinary flanging machine is not of sufficient power to flange furnace mouths or where it is fully employed on plain flanging.

French Shops. Important Boiler Construction in French Shops, G. L. Carden. Boiler Maker, vol. 23, no. 9, Sept. 1924, pp. 249-251, 5 figs. Describes Fives-Lille boiler works which have been enlarged since war and improvements made in Delaunay-Belleville boiler.

The French Babcock and Wilcox Boiler Works, G. L. Carden. Boiler Maker, vol. 24, no. 4, Apr. 1924, pp. 95-98, 4 figs. Description of plant located at La Courneuve on northern outskirts of Paris.

The Trend in French Boiler Construction, G. L. Carden. Boiler Maker, vol. 24, no. 1, Jan. 1924, pp. 1-3, 2 figs. Progress as shown at Y. & A. Niclausse works; tendency to larger units; noteworthy installations.

Locomotive Boilers. Building the Longest Locomotive Boilers in the World. Boiler Maker, vol. 24, no. 5, May 1924, pp. 127-133, 13 figs. Details of construction of boilers recently built by Am. Locomotive Co. for an order of 25 simple 2-8-8-2 Mallet locomotives for Chesapeake & Ohio R. R.; overall length of boiler 56 ft. 11⅛ in.; 205 lb. steam pressure.

See also LOCOMOTIVE BOILERS, Manufacture.

Machines and Methods. Boilermaking Machines and Methods (Maschinen und Herstellungsverfahren im Dampfkesselbau), F. Loch. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 9, Mar. 1, 1924, pp. 194-197, 13 figs. Modern

boiler factory; testing, planing and bending of plates; assembling and riveting of boilers; construction of maximum-pressure boilers.

Modern Boilermaking Methods. Eng. Production, vol. 7, no. 138, Mar. 1924, pp. 78-81, 8 figs. Describes works and procedure of Davey, Paxman & Co., Ltd., Colchester, Eng., makers of all types of steam boilers.

The Construction of a Steam Boiler. Southern Engr., vol. 41, no. 2, Apr. 1924, pp. 35-41, 26 figs. Successive steps in construction of a steam boiler; how boiler tubes are made.

Riveting. Modern Demands on Hydraulic Boiler Riveting (Neuzeitliche Forderungen an die hydraulische Kesselnietung und die Möglichkeiten ihrer Erfüllung in der Praxis), H. Müller. Werkstattstechnik, vol. 18, no. 19, Oct. 1, 1924, pp. 538-543, 7 figs. Production of faultless riveted joints, water-tight and steam-tight; types of riveting; riveting control apparatus, etc.

Standards. Standards Adopted by the American Boiler Manufacturers' Association. Boiler Maker, vol. 24, no. 4, Apr. 1924, pp. 107-109 and 123-124. Report presented at meeting of Am. Boiler Mfrs.' Assn.

Welding. See ELECTRIC WELDING, Boiler Construction and Repair.

BOILERS

Accidents. Peculiar Cases of Accidents to Containers and Boiler Parts (Eigenartige Zerstörungen von Gefässen und Kesselteilen), M. Grellert. Gesundheits-Ingenieur, vol. 47, no. 7, Feb. 16, 1924, pp. 49-52, 4 figs. Gives a number of concrete examples showing that accidents are often due to causes other than those assumed or anticipated; all the cases cited were due to inadequate calculation of design or to careless construction.

A. S. M. E. Codes. American Steam Boiler Code (Amerikanische Dampfkesselvorschriften), Rich. Baumann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 47, Nov. 22, 1924, pp. 1219-1223, 18 figs. Discusses important sections of new code and compares them with corresponding German specifications; specifications for plate, water tubes, copper and brass; specifications for design of boiler parts.

Transposing A. S. M. E. Boiler Code Formulas, J. E. Londregan. Boiler Maker, vol. 23, no. 11, Nov. 1924, pp. 324-327. Explains terms of formulas commonly used in boiler work and their use in solving for unknown factors.

Atmos. See Circulation.

Baffles. Designing Boiler Baffles, A. W. Patterson, Jr. Combustion, vol. 11, no. 2, Aug. 1924, pp. 122-124, 7 figs. Some problems brought about by incorect baffle design, and methods by which conditions in particular plants were remedied.

Benson High-Pressure. Steam Generation at the Critical Temperature. Chem. & Industry, vol. 43, no. 10, Mar. 7, 1924, pp. 249-250. Describes Benson 3200-lb. pressure boiler.

Testing the Benson Superpressure Generator, D. Brownlie. Power House, vol. 17, no. 11, June 5, 1924, pp. 43 and 60. Success of coil boiler operated at approximately 3200 lb. pressure per sq. in. and 706 deg. Fahr. in Rugby Works of English Elec. Co.

The Benson Boiler. Electrician, vol. 92, no. 2391, Mar. 14, 1924, p. 324. Theoretical principles of steam generator with a working pressure of 3200 lb. per sq. in.

The Scientific Principles of the Benson High pressure boilers; development of design of first Boiler House Rev., vol. 37, no. 10, May 1924, pp. 358-360, 2 figs.

Circulation. The Circulation Boiler (Der umlaufende Dampfkessel), Wintermeyer. Feuerungstechnik, vol. 12, nos. 15 and 16, May 1 and 15, 1924, pp. 127-128 and 137-138, 6 figs. High-pressure boilers; development of design of first Atmos boiler; present aims in design of circulation boilers.

Code, Indian. An Examination of the New Indian Boiler Regulations, 1924, D. R. Macintosh. Instn. Engrs. (India)—Jl., vol. 4, Apr. 1924, pp. 93-147. Examination of new regulations for material, design, construction and inspection of land boilers in India.

Codes. See A. S. M. E. Codes.

Compounds. See BOILER FEEDWATER, Treatment.

Construction. See BOILERMAKING.

Construction Materials, Examination of. From the Border Line of Boiler Making and Iron Metallurgy (Aus dem Grenzgebiete zwischen Kesselschmiede und Eisenhüttenwerk), M. Roeckner. Archiv für Wärmewirtschaft, vol. 5, no. 7, July 1924, pp. 127-136, 28 figs. Discusses metallographic examination of boiler material and its results, welding seams, tests, consequences to be drawn from them for choice and treatment of boiler materials.

Corrosion. Corrosion and Scaling in Modern Boiler Practice. Chem. Age (Lond.), vol. 10, no. 251, Apr. 5, 1924, pp. 26-27. Notes on causes and prevention.

Corrosion in Steam Boiler Plant, G. E. Swett. Pac. Mar. Rev., vol. 21, no. 7, July 1924, p. 383, 1 fig. Describes apparatus known as Hickman air separator, an automatic method of eliminating chief cause of depreciation in steam-generating equipment.

Rusting, Corrosion and Water Purification (Abrostung, Korrosion und Wasserreinigung), P. Hermann. Archiv für Wärmewirtschaft, vol. 5, no. 9, Sept. 1924, pp. 177-178. Discusses action of dissolved oxygen in rusting, corrosion due to free acids, part of carbonic acid.

Tests for Corrosion of Boiler Material at High Pressure, W. Lulofs. Elec. Times, vol. 66, no. 1730, Dec. 11, 1924, pp. 689-690, 3 figs. Results of tests carried out in author's laboratory, from which it is concluded that there is more corrosion at 40 than at 16 atmos.

See also BOILER FEEDWATER, Treatment.

Dampers. Notes on Boiler-flue Dampers, D. Wilson. Mech. Wld., vol. 76, no. 1968, Sept. 19, 1924, pp. 184-185, 6 figs. Discusses design of dampers for flues conveying gases of combustion in connection with steam-boiler and high-temperature furnace installations.

Developments. An Outline of Boiler Development, H. Webster. Refrig. Eng., vol. 10, no. 10, Apr. 1924, pp. 367-369. Considers briefly multiplicity of fuels available for steam generation, great number of methods of burning such fuels which have been developed, and the various feedwater conditions that have been encountered, and outline of development of boiler.

Boilers and Boiler Auxiliaries. Power, vol. 59, no. 1, Jan. 1, 1924, pp. 6-9. Foreign designs for high pressure; use of electric boilers increasing; developments in radiant heat; large combustion space favored; economy of stage bleeding; new instruments.

Electrically Heated. Electric Boilers (Les chaudières électriques), P. Bergeon. Revue Universelle des Mines, vol. 67, no. 4, Feb. 15, 1924, pp. 241-248. Discusses resistance boilers, induction boilers, and electrode boilers; comparison of cost of steam in electric and other boilers; application of electric boilers.

Electric Boilers (Elektriska ångpannor, deras driftförhällanden och senaste utveckling), O. Stälhane. Teknisk Tidskrift (Elektroteknik), vol. 54, no. 12, Dec. 6, 1924, pp. 227-234, 15 figs. Discusses two different types, the resistance type, where elements of metallic resistance are placed in tubes, and the electrode type, where water itself furnishes resistance; use of former is restricted to relatively low voltages; of latter type there are a considerable number in use, but great deal of trouble has been encountered, principal sources of which seem to be variations in composition of feedwater and deterioration of electrodes; describes modification of electrode type which seems to possess very promising features; instead of using entire water volume as heat and steam generator, current is carried through jet of water.

Electrically Heated Steam Boilers. Eng. & Boiler House Rev., vol. 38, no. 5, Nov. 1924, pp. 186-188, 3 figs. Their possibilities for increasing load factor.

Experience with Electric Boilers in Textile Mills. (Erfahrungen mit einem Elektrokessel im Textilbetriebe), V. R. Pietsch. Sparwirtschaft, no. 13-14, July 1924, pp. 64-66 (GW). Discusses efficiency, insulation, possibility of effective regulation, economics, distribution of electric energy, etc.

Tests on Electric Boilers, C. Dantsizen and E. H. Horstkotte. Elec Wld., vol. 84, no. 22, Nov. 29, 1924, pp. 1156-1157, 2 figs. Liberation of hydrogen in 5000-ky., 6600-volt unit found to be small and to cause no detrimental action.

Using Intermittent Energy of Hydroelectric Plants for Electric Boilers (Utilisation par les chaudières électriques de l'énergie intermittente des usines hydro-électriques), Bergeon. Société Française des Electriciens—Bul., vol. 4, no. 37, July 1924, pp. 653-657. Cites various examples in France where such energy is being successfully employed.

See also STEAM GENERATORS.

Equipment. Boiler Equipment. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924. Includes following articles: Description of Standard Types of Water Columns, Steam Gages, Fusible Plugs, Safety Valves, Steam Outlet Valves and Blowoff Valves, pp. 73-76, 9 figs.; Types and Details of Safety Valves, pp. 76-79, 10 figs.; Steam Outlet and Blowoff Valves, pp. 79-85, 22 figs.

Evaporative Capacity. Evaporative Capacity of Boilers, A. A. Arnold. Mech. Wld., vols. 75 and 76, nos. 1956, 1961, 1963, and 1966, June 27, Aug. 1, 15 and Sept. 5, pp. 405, 69-70, 104-105 and 151. Considers normal evaporative capacity of boilers which may be obtained under usual conditions of working and when circumstances may be regarded as moderately favorable. Gives table showing average evaporation from Lancashire and Cornish boilers according to their heating surface. Stationary locomotive-type boilers, vertical cross-tube boilers, vertical Cochrane boilers, and their performances.

Exhaust-Gas. Waste Exhaust Gases of Low-Powered Oil Engines. Oil Engine Power, vol. 2, no. 3, Mar. 1924, pp. 78-79 and 91-92, 1 fig. Conresults of two types of small exhaust-gas boilers, one for a 2-cycle surface-ignition unit and other for a 4-cycle Diesel engine.

See also Waste-Heat.

Explosions. See BOILER EXPLOSIONS.

Feed Pumps. See PUMPS, Boiler-Feed.

Feeding. Important Factors in Boiler Feeding. Chas. F. Wade. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 136-137, 1 fig. Aspects of boiler-feeding arangements which are often overlooked.

Feedwater. See BOILER FEEDWATER.

Fire Tube, Refractory Spiral Inserts for. Helically Bladed Refractory Inserts for Fire-Tube Boilers (Einbau und Wirkungsweise von Drallsteinen in Flammrohrkesseln), H. von Unger. Wärme, vol. 47, no. 32, Aug. 8, 1924, pp. 374-377, 5 figs. Results of experiments carried out at Gutehoffnungshütte, using helically bladed firebrick inserts in the fire tubes to improve heat transmission, eliminate flue dust, increase velocity of flue gases, observe effect of cores on draft, effect on combustion, etc.

Firing. See BOILER FIRING.

Flue Replacement. Saving Time and Labor on Flue Jobs, C. A. Chincholl. Boiler Maker, vol. 24, no. 3, Mar. 1924, pp. 78-79 and 91-92, 1 fig. Construction and usefulness of three devices necessary wherever boiler flues are replaced in boilers, viz., a flue swaging machine for 2-in. flues, a flue cutter for cutting flues to length, and an attachment for an air motor to cut flues in front end.

Furnaces. See BOILER FURNACES.

Fusible Plugs. See LOCOMOTIVE BOILERS, Fusible Plugs.

Gas-Fired. Gas-Fired Boiler Feed System. Gas Age-Rec., vol. 54, no. 24, Dec. 13, 1924, pp. 835-836, 1 fig. Operating procedure of new automatic electrically operated return feedwater system for gas-fired boilers developed by Thomas Pump Works, Inc., of New York City.

Gas-Fired Boilers, J. D. Troup. Combustion, vol. 10, no. 2, Feb. 1924, pp. 110-113, 4 figs. Discussion of increasing importance of gaseous fuel as a possible or probable development of future, and of experience obtained and equipment available in use of gas for generating steam.

Gas Guide Vanes. Influence of Refractory Gas Guides in Boilers (Die Wirkung von Einbauten in Flammrohrkesseln), Unger. Archiv für Wärmewirtschaft, vol. 5, no. 4, Apr. 1924, pp. 61-69, 17 figs. Propeller-shaped devices of refractory material are inserted in fire tubes and give flue gases a spiral-shaped movement that improves combustion as well as heat transmission. Economy of old and new plants is greatly improved by simple and inexpensive means.

Heads, Damages to. Damages to Heads of Boilers (Avaries à des fonds emboutis de chaudières), E. Allar. Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 5, no. 17, July 1924, pp. 149-162, 3 figs. Describes test on boiler heads showing that damage was due to change in metal, quality and treatment of metal having been satisfactory.

Heat-Balance Calculation. Calculation of the Boiler Heat Balance. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 991-995, 9 figs. Solution of a problem and an analysis of conditions which affect boiler economy over various periods of operation.

Discussion of the Heat Balance in Boiler Tests, A. Linguet. Paper Trade Jl., vol. 78, no. 5, Jan. 31, 1924, pp. 49-53. Paper Trade Jl., vol. 78, no. 5, Jan. 31, 1924, pp. 49-53. Discusses value of heat-balance calculations in making boiler tests. Translated from Chimie et Industrie, vol. 10, No. 5, Nov. 1923.

Heat Losses. Heat Loss Due to Sensible Heat in Boiler Refuse, E. Ogur. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 287-289, 3 figs. Demonstrates that loss due to sensible heat in fuel is appreciable and gives method for determining loss by test, computation or diagram.

Heat Transmission in. See HEAT TRANSMISSION, Boilers.

Heating. See Ratings.

Heating, Acceptance of. Acceptance of Heating Plants (Sul collaudo degli impianti di riscaldamento), A. Marolda. Industria, vol. 38, no. 14,

July 31, 1924, pp. 391-398, 14 figs. Discusses systems of boiler acceptance in use in Italy; first, that of Associazione Impiantatori generally used, consisting of operating boiler at maximum temperature stipulated, whatever the outside temperature; and second, that of Associazione Termotecnica Italiana, based on "conventional temperature." Proposes modified and more accurate procedure.

Heating, Smokeless. Smokeless Heating Boilers, T. N. Thomson. Plumbers Trade Jl., vol. 77, no. 1, July 1, 1924, pp. 26-28 and 92, 3 figs. Development and manufacture of Utica Imperial smokeless boiler.

Heating-Surface Arrangements. The Numerical Evalution of Heating-Surface Arrangements (Die zahlenmässige Bewertung von Heizflächenanordnungen), W. Otte. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 3-4, Feb. 29, 1924, pp. 19-23, 11 figs. Investigates influence of geometrical arrangement of boiler heating surface on heat transmission through radiation and contact; derivation of numerical values; examples.

High Pressure. See Benson High-Pressure; Circulation; 3200-lb. Pressure.

High Pressure, Dry Steam Production in. Dry Steam and How to Produce It in High-Pressure Boilers (La vapeur sèche et les moyens de la produire dans les générateurs à haute vaporisation), M. Bussac. Société les Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 262-278, 4 figs. Describes a new boiler in which steam is much drier than usual, being produced by a much higher rate of evaporation.

Horizontal Return Tubular. Horizontal Return Tubular Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 19-21, 2 figs. Due to influence of standardization selection depends largely upon boiler-shop practice. See also article entitled, Setting the Horizontal Return Tubular Boiler, pp. 21-23, 4 figs.

Hydrostatic Tests. Hydrostatic Pressure Tests on Boilers, W. H. Fittus. Power Plant Eng., vol. 28, no. 4, Feb. 15, 1924, pp. 219-220. Points out that many defects are not revealed by hydrostatic test; inspector must depend on visual examinations and hammer test.

Inspection. Boiler Inspecting in Afghanistan, G. Cecil. Boiler Maker, vol. 23, no. 11, Nov. 1924, pp. 318-319. Difficulties encountered in introducing and successfully operating steam power and machinery in a distant part of world.

Coöperation of Inspectors and Power-Plant Engineers in Associations for Steam-Boiler Inspection (Die Zusammenarbeit der Revisions- und Wärmeingenieure bei den Dampfkessel-Ueberwachungs-Vereinen), M. Berner. Wärme, vol. 47, no. 26, June 27, 1924, pp. 301-302. Proposes inspection and thermotechnical work by engineers; points out increased efficiency obtained by employing heat engineers; discusses coöperation between groups of associations, etc.

Proposed Rules for the Inspection of Material and Boilers. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 100-103, 1 fig. Preliminary report of sub-committee of A. S. M. E. boiler code committee on rules for inspection of material and boilers.

Lap Joints, Danger of. Danger of Lap-Joints (Note sur un danger éventuel des joints à clins), M. Flaissier. Bul. Technique du Bureau Veritas, vol. 6, no. 9. Sept. 1924, pp. 171-175, 18 figs. Discusses additional stresses due to asymmetry of joint and demonstrates them by calculatior

Large-Capacity Boilers at Cleveland Rate 3060 Hp. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 517-524, 8 figs. New boilers in Cleveland Elec. Illuminating Co. plant have 30,592-sq. ft. heating surface requiring 8 mi. of tubes; fired by pulverized coal; automatic-combustion control by steam pressure and flowmeters.

Large-Capacity Boilers for Central Stations. Pulverized-Coal-Fired Boilers (Chaudières à grande capacité pour centrales électriques. Les chaudières au charbon pulverisé), M. Demoulin. Génie Civil, vol. 84, no. 20, May 17, 1924, pp. 465-471, 7 figs. Characteristics of large boiler types; evolution of boilers; the Ladd-Belleville in Vitry (Seine) central station; new boilers of the Union d'Electricité for burning of pulverized coal.

Large Steam Boilers and Steam Storage in Germany. Power Engr., vol. 19, no. 216, Mar. 1924, pp. 86-89, 5 figs. Review of German technical publication by Fried. Münzinger, on American and German large steam boilers.

Loading for Maximum Efficiency. Loading the Boilers to Obtain Maximum Efficiency, Chas. E. Coburn. Power, vol. 60, no. 17, Oct. 21, 1924, pp. 642-643, 3 figs. Points out that by properly dividing load among boilers in service and by strict attention to keeping controllable losses at their lowest, boiler load may always be maintained at its reasonably highest efficiency.

Locomotive. See LOCOMOTIVE BOILERS.

Manufacture. See BOILERMAKING.

Marine. See MARINE BOILERS.

Maximum-Pressure. See STEAM, Maximum-Pressure.

Mercury-Vapor. Mercury Boiler in Successful Operation. Power Plant Eng., vol. 28, no. 2, Jan. 15, 1924, pp. 136-138, 5 figs. Combination mercury and steam cycle shows remarkable savings at Hartford Elec. Light Co. plant.

The Emmet Mercury Vapour Plant. Engineer, vol. 137, no. 3551, Jan. 18, 1924, pp. 65-68, 4 figs. General arrangements and details of plant installed at Hartford Elec. Light Co.'s station at Hartford, Conn.

The Emmet Mercury-Vapor Process, W. L. R. Emmet. Mech. Eng., vol. 46, no. 5, May 1924, pp. 235-240 and 305, 13 figs. Early experiments; thermodynamic possibilities of process; Hartford installation; boiler problems; mercury turbines; packings and leakage; economies attainable; mercury supply.

The Mercury-Vapor Boiler and Turbine. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 91-93, 3 figs. Describes plant installed at Hartford and basic idea of plant; properties of mercury vapor which make it advantageous for use in binary-vapor system; difficulties with use of mercury; recent discussion on mercury-vapor system.

See also MERCURY-VAPOR PROCESS.

Multitubular. Results of Tests of Multitubular Boilers with Direct Flow (Résultats d'esai de chaudières multitubulaires à flux direct), M. P. Pourchot. Outillage, vol. 8, no. 8, Aug. 1924, pp. 276-281, 5 figs. Describes recent installation at Louire Mines and Houillères de Montrambert Mines, where special difficulties had to be met; gives evaporation tests with low-grade fuels, etc.

Oil-Burning, Preparing for. See OIL FUEL. Burning.

Operation and Types. Boilers, Superheaters and Economizers. Nat. Elec. Light Assn.—Serial Report of Prime Movers Committee, Sept. 1924, 57 pp., 80 figs. Principal features of many boiler installations made during past year in old as well as new stations. Describes combined boiler, superheater, economizer and air heater manufactured by Stahl Turbine Co. of Sweden. Effectiveness of soot blowing equipment. Operating results obtained at Lakeside Station of Milwaukee Elec. Ry. & Light Co. with a Foster economizer and radiant-heat-type superheater installed in

connection with an Edge Moor boiler fired with pulverized fuel. Manufacturers' statements. Bibliography.

See also BOILER OPERATION.

Parts. Strength of. Strength of Boiler Parts. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 30-34, 6 figs. Strength of riveted joints; welded joints; heads and stays in boiler shells; boiler tubes; steam nozzles.

Piping. Boiler Piping Arrangements. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 86-88, 4 figs. Feedwater, blowoff, drip and drain safety valve and steam piping. See also article entitled, Safety First Should Be Feature of Boiler Piping, pp. 88-89, 2 figs.

Portable, Inefficient Handling of. Inefficient Handling of Field Boilers Source of Waste and Expense, F. G. D. Muller. Nat. Petroleum News, vol. 16, no. 29, July 16, 1924, pp. 77-79, 4 figs. Discusses improving efficiency of boilers, preheating feedwater, driller's ear attuned to exhaust, water filter for field boilers and uses for old boilers.

Priming. Priming of Boilers, A. A. Pollitt. Gas Engr., vol. 40, no. 576, Apr. 1924, pp. 74-76, 1 fig. Discusses problem of priming and necessity for maintaining low concentrations in feedwater.

Ratings. Progress in the Rating of Heating Boilers. Heating & Vent. Mag., vol. 21, no. 10, Oct. 1924, pp. 46-47, 1 table. Comparison of three methods, including that announced by Chicago Master Steamfitters' Assn.

Repairing. See OXY-ACETYLENE WELDING, Boilers.

Scale Prevention. See BOILER FEEDWATER, Treatment.

Scale-Removal. Apparatus for the Prevention of Boiler Scale. Engineering, vol. 117, no. 3045, May 9, 1924, p. 623, 4 figs. Apparatus exhibited at Brit. Empire Exhibition consists of cast-iron cylinder within which perforated cylinder is placed which is filled with ordinary linseed and small amount of common soda.

Boiler Scale and Scale Cleaners. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 38-44, 21 figs. Formation of scale in boilers, its dangers, methods of removing scale and preventing its formation.

Boiler Tubes and Boiler Scale. Eng. & Boiler House Rev., vol. 37, no. 10, May 1924, pp. 370 and 372-373, 3 figs. Some of the most modern methods of scale removal.

Removal of Scale with Carbon Dioxide, C. L. Jones. Power, vol. 60, no. 15, Oct. 7, 1924, pp. 578-579, 1 fig. Factors affecting removal of deposits. Suggestions in connection with problems in removal of deposit from pipe lines, etc.

See also Corrosion.

Seams, Brittleness and Cracks in. Brittleness and Cracks in Seams of Steam Boilers, H. Kriegsheim. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 792-795, 6 figs. Causes and prevention of so-called caustic embrittlement.

Settings. Boiler Setting for Economical Steaming, Z. Kogan. Sugar, vol. 26, nos. 1 and 2, Jan. and Feb. 1924, pp. 8-9 and 77-78, 15 figs. Analysis of problem from sugar engineer's standpoint.

Construction of Boiler Settings in Devon Station (Conn.), Power, vol. 59, no. 20, May 13, 1924, pp. 763-765, 6 figs. Furnace walls for 16,800-sq. ft. boilers constructed entirely of firebrick; arches built in walls to relieve loading on brick; expansion joints filled with asbestos fiber divide walls into vertical sections and allow for horizontal expansion; no heat-insulating bricks are used below lower tube line.

Soot Blowers for. See SOOT BLOWERS.

Specifications. Technical Specifications for the Supply of Forged or Stamped Pieces of Extra-Soft Rolled Steel for Boilers and Other Steam Vessels (Spécification technique pour la fourniture de pièces forgées ou embouties, en acier laminé extra-doux pour chaudières et autres appareils à vapeur). Assns. Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 5, no. 17, July 1924, pp. 171-176. Rules established by French Steam Boiler Users' Assn.

Standardization. Sixteen Years of Boiler Standardization, J. A. Stevens. Power, vol. 60, no. 6, Aug. 5, 1924, pp. 217-218. Details of work of Boiler Code Committee.

Staybolts. The Expanded Boiler Bolt (Der Aufdornstehbolzen), A. Tross. Hanomag-Nachrichten, vol. 11, no. 128, June 1924, pp. 96-105, 25 figs. Older design, in which oversize threaded bolt was riveted at both ends, has been substituted by new type hollow bolt, which has an easy-fitting thread, and is expanded to a tight fit after being screwed in place between two boiler plates. Complete description of all processes involved.

Steam Accumulators. See STEAM ACCUMULATORS.

Superheaters. See SUPERHEATERS.

Tests. Boiler-Room Economy (L'économie dans la chaufferie), H. Carra. Chaleur & Industrie, vol. 5, nos. 48 and 49, Apr. and May 1924, pp. 182-188 and 238-242, 5 figs. Methods of conducting evaporation tests on steam boilers and their auxiliaries.

Evaporation Tests (Les essais de vaporisation), V. Kammerer. Société Industrielle de Mulhouse —Bul., vol. 90, no. 1, Jan. 1924, pp. 27-56. Classification of tests into scientific, performance, industrial and comparative tests; duration and conducting of tests; determination of efficiency and heating value; distribution of losses; heat balance; presentation of results. Author points out difficulties in formulating concise rules for conducting evaporation tests and presenting results.

Importance of Boiler Plant Test, H. Seymour. Electrician, vol. 92, no. 2392, Mar. 21, 1924, pp. 351 and 357. How to conduct a test to find out how well boilers are doing their work.

See also Heat-Balance Calculations; Hydrostatic Tests.

3200-Lb.-Pressure. The World's Largest Steam Boiler, A. C. Blackall. Blast Furnace & Steel Plant, vol. 12, no. 9, Sept. 1924, pp. 420-422. Describes boiler recently constructed by English Elec. Co. at Rugby which raises steam at a pressure of 3200 lb. per sq. in. Is practically a "flash" boiler on a large scale. Steam generated will be reduced to a pressure of 1500 lb. for use in a turbine running at 25,000 r.p.m.

Transportation. Boiler Cars for Boilers That Can Be Run on to a Krupp Delivery Truck (Kesselwagen mit abfahrbaren Kesseln zum Umschlag des Ladegutes auf Krupp-Sattelschlepper), F. Finckh. Kruppsche Monatshefte, vol. 5, Aug.-Sept. 1924, pp. 167-171, 6 figs. Details of a freight car carrying four boilers crossways, and a motor truck or tractor onto which boilers can be rolled endwise, for more economic transportation.

Tubes. See BOILER TUBES.

Types. Steam Boiler Manufacture in Germany and America. La. Planter & Sugar Mfr., vol. 72, no. 11, Mar. 15, 1924, pp. 216-217. Different types of boilers used in various manufacturing concerns. Translation of article by K. Schiebl in Centralblatt für die Zuckerindustrie.

Vertical. Adaptability of Vertical Tubular Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1,

1924, pp. 24-26, 5 figs. Suited for installations where compactness and low first cost are of prime importance.

Stresses in Unevenly Heated Boiler Drums (Spannungen in ungleich erwärmten Kesseltrommeln), W. Otte. Wärme, vol. 47, no. 46, Nov. 14, 1924, pp. 553-555, 2 figs. Damages due to uneven heating of drums; rigid and elastic drums; remedies.

Wadurf. The Wadurf Boiler (Der Wadurfkessel), P. Zwiauer. Stahl u. Eisen, vol. 44, no. 16, Apr. 17, 1924, pp. 435-438, 3 figs. Description of Wadurf system and results of tests.

Waste-Heat. Generating Steam from Waste Heat, C. H. S. Tupholme. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 943-945, 2 figs. Discussion of design of and results of tests on waste-heat boilers, which must be designed to evaporate water almost wholly from heat of convection.

Good Results from New Type Fire-Tube Waste-Heat Boilers in Open-Hearth Plant. Power, vol. 60, no. 22, Nov. 25, 1924, pp. 832-834, 3 figs. Bettendorf Co., manufacturer of railway cars and material, has installed six waste-heat boilers of high-velocity, single-pass, fire-tube type of new design; results of 8-hr. tests; exceptional economies attributed to straight flow and high gas velocity in relatively small tubes; scrubbing action of gases keeps surface clean, and strong agitation results in high heat transfer.

Practical Experiences with Waste-Heat Boilers Back of Open-Hearth Furnaces (Betriebserfahrungen mit Abhitzekesseln hinter Siemens-Martin-Oefen), W. Schuster. Stahl u. Eisen, vol. 44, no. 3, Jan. 17, 1924, pp. 65-71, 4 figs. Describes four different types of boiler for waste-heat utilization in open-hearth furnaces, and gives operating results of three types; problem of superheater and preheater; prospects.

Some Notes on Waste Heat Boilers, C. H. Sonntag. Concrete, vol. 25, no 5, Nov. 1924, pp. 88-90 (Cement Mill Section). Notes on feedwater, baffles, dust removal, suction fan and fan motor, and flue design.

Utilizing Waste Heat, K. W. Heinrich. Pac. Mar. Rev., vol. 21, no. 7, July 1924, pp. 376-377, 3 figs. Describes fire-tube steam or hot-water generator especially adapted for reclaiming heat from exhaust gases of Diesel engines, developed by Davis Eng. Corpn. Possibilities of application.

Waste-Heat Boilers, C. H. Bamber. Gas World, vol. 80, no. 2059, Jan. 5, 1924, pp. 19-20. Waste-heat versus solid fuel and convection versus radiation; waste-heat boiler design; water-tube boiler for waste heat; fire-tube boiler.

Waste-Heat Boilers and Vertical Retort Installations. Gas. Jl., vol. 167, no. 3190, July 2, 1924, pp. 106-122, 20 figs. See also Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 633-647, 5 figs., and Gas Engr., vol. 40, no. 579, July 1924, pp. 145-147, 4 figs. Twelfth Report of Research Sub-Committee of Gas Investigation Committee. Investigation conducted on water-tube waste-heat boilers attached to installations of Woodhall-Duckham continuous vertical retorts at Windsor Street works of Birmingham Gas Dept.

Waste-Heat Boilers at Weirton Steel Plant, W. E. Groume-Grjimailo. Iron Age, vol. 113, no. 6, Feb. 7, 1924, pp. 443-444, 2 figs. Analyzed according to hydraulic theory of furnaces; belief expressed that waste-heat boilers are undesirable.

Waste Heat Boilers for Vertical Retort Benches, C. H. S. Tupholme. Gas Age-Rec., vol. 53, no. 12, Mar. 22, 1924, pp. 351-352. British progress in waste heat recovery from flue gas as seen in a London works.

Waste Heat from Internal-Combustion Engines. Power Engr., vol. 19, no. 218, May 1924, pp. 176-177, 3 figs. Describes Clarkson boiler which is said to be well suited to small engines; its application to semi-Diesel engine.

See also Exhaust-Gas; WASTE HEAT, Industrial Furnaces, Recovery from; Utilization.

Water Circulation. Chasing Bubbles in a Boiler. Power, vol. 59, no. 8, Feb. 19, 1924, pp. 288-289, 6 figs. Outline of where steam forms in boiler and path of water circulation; describes glass model boiler used in study.

Increasing the Efficiency of Boiler Plants (Zur Leistungssteigerung von Dampfkesselanlagen), P. Fessler. Wärme- u. Kälte-Technik, vol. 26, no. 4, Feb. 15, 1924, pp. 23-25, 4 figs. Study of water circulation; it is shown that artificial water circulation through so-called water-circulating apparatus is effective in increasing efficiency of boiler and at same time increasing economy of plant.

Water Circulators, Testing of. Report on Testing of Water Circulating Apparatus (Bericht über die Prüfung von Wasser-Umlaufapparaten), W. Deinlein. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 16, 17, 18, and 19, Aug. 31, Sept. 15, 30, and Oct. 15, 1924, pp. 148-149, 158-161, 167-170, and 177-178, 3 figs. Details of experiments with two apparatus to determine their effect.

Water-Level Gages. A New Level Indicator. Engineer, vol. 138, no. 3597, Dec. 5, 1924, p. 647, 5 figs. Describes two types of gages made by Aster Eng. Co., Wembley, one for boiler work, and other for showing level in open tanks.

Progress in Design of Feedwater Level Indicators for High-Pressure Boilers (Fortschritte im Bau von Wasserstandsanzeigern für Dampfkessel mit hohen Betriebsdrücken), E. Edler. Praktische Maschinen-Konstrukteur, vol. 57, no. 34, Sept. 9, 1924, pp. 470-471, 5 figs. Design and operation of level indicators for boiler pressures of 12 to 30 atmos. or more, such as Escowa type.

Water-Level Indicators (Verschobene Wasserstandsanzeiger), K. Schreber. Wärme, vol. 47, no. 49, Dec. 5, 1924, pp. 585-587, 3 figs. Requisites of a water-level indicator; Hanomag indicator; differential manometer; Igema indicator.

Water-Tube. See BOILERS, WATER-TUBE.

Water-Tube-Fire-Tube. The Findlay Boiler. Power Engr., vol. 19, no. 224, Nov. 1924, pp. 427-428, 3 figs. Special features of new design of water-tube-fire-tube boiler.

Welded. See OXY-ACETYLENE WELDING, Pressure Vessels.

Welding. See AUTOGENOUS WELDING, Boilers.

Yarrow. Yarrow Boilers at Londonderry Power Station. Engineering, vol. 118, no. 3057, Aug. 1, 1924, pp. 177-178, 3 figs. Details of Yarrow boilers (large combustion space and straight tubes) and test data; heating surface, 3255 sq. ft.; superheating surface, 410 sq. ft.; economizer surface, 1550 sq. ft.; total grate area, 88.7 sq. ft.

BOILERS, WATER-TUBE

Baffling. Increased Efficiency Through Changes in Boiler Baffling, H. E. Osgood. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 769-770, 4 figs. Changes made in well-known type of water-tube boiler illustrate influence exerted by baffling of boiler on its efficient operation.

British Developments. British Developments in Water Tube Boilers, F. Johnstone-Taylor. Power Plant Eng., vol. 28, no. 3, Feb. 1, 1924, pp. 173-174, 3 figs. New designs provide for independent circulation of water in tubes nearest fuel bed.

Cammell-Laird. Building a Straight Tube Watertube Boiler, F. G. Bailey. Boiler Maker, vol. 23, no. 12, Dec. 1924, pp. 344-347, 3 figs.

Development of Cammell-Laird three-drum type boiler and practical details of its construction.

Clayton. The Clayton Water Tube Boiler. Eng. & Boiler House Rev., vol. 37, no. 9, Apr. 1924, p. 328, 1 fig. Notes on boiler which is development of Clayton & Shuttleworth, Ltd.; made in two distinct types, straight-tube sectional and curved-tube drum type.

The Clayton Water-Tube Boilers, W. S. Findlay. Power Engr., vol. 19, no. 215, Feb. 1924, pp. 52-53 and 62, 4 figs. Critical discussion of special features, and particularly of circulation.

Kidwell. See Two-Flow Ring-Circuit.

Maas. Tests with the Maas Boiler, a New Sectional Vertical High-Power Boiler (Versuche an dem neuen Sektional-Steilrohr-Hochleistungskessel Bauart Maas), F. Kaiser. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 15 and 16, Aug. 15 and 31, 1924, pp. 133-135 and 145-148, 1 fig. Details of design, construction and operation of Maas boilers for Franken central station in connection with acceptance test carried out by the association. Describes tests.

Marine. See MARINE BOILERS, Water-Tube.

Möller Vertical. Temperature Distribution and Water Circulation in Möller Vertical-Tube Boilers (Temperaturverteilung und Wasserumlauf beim Möller-Steilrohrkessel), O. Berner. Wärme, vol. 47, no. 10, Mar. 7, 1924, pp. 93-97, 6 figs. Discusses temperature distribution in starting and in operating, water circulation in state of inertia. Effect of feeding and suddenly increased drawing off of steam on water circulation.

Power-Station. Notes on the Origin and Development of Water-Tube-Boilers for Power Stations, E. Kidwell. Combustion, vol. 11, nos. 2 and 3, Aug. and Sept. 1924, pp. 146-152 and 214-216, 15 figs. Shows origin of a few leading types of boilers used today in American plants and principal influences which shaped their development.

Standard American. Details of Standard Water-Tube Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 7-18, 36 figs. Descriptions and illustrations showing best practice of modern American design and construction.

Temperature Variation, in. Temperatures in Water-Tube Boilers. Power, vol. 60, no. 16, Oct. 14, 1924, p. 604, 1 fig. Investigations at Rensselaer Inst. show little variation throughout boiler.

Two-Flow Ring-Circuit. The Kidwell Two-Flow Ring-Circuit Boiler. Pac. Mar. Rev., vol. 21, no. 2, Feb. 1924, p. 119, 1 fig. Boiler is said to introduce entirely new principle of arrangement in water-tube boilers.

Types. Water-Tube Boilers, C. C. Pounder. Mech. World, vol. 75, nos. 1932 and 1936, Jan. 11 and Feb. 8, 1924, pp. 26-27 and 84-86, 6 figs. Description of various types.

Vertical. Foreign Practice in Vertical Water-Tube Boilers, F. Johnstone-Taylor. Power Plant Eng., vol. 28, no. 22, Nov. 15, 1924, pp. 1140-1141, 3 figs. Describes number of European types of boilers, together with their relative advantages; the Nesdrum boiler, a British design.

Loading of Materials in Various Types of Vertical Boilers (Die Materialbeanspruchungen bei verschiedenen Steilrohrkesselbauarten), G. Beck. Zeit. des Bayerischen Revisions-Vereins, vol 28, nos. 11 and 12, June 15 and 30, 1924, pp. 93-96 and 106-108, 9 figs. Formulas for calculating thickness of plates; shows how to reduce loads to minimum during operations.

Waste-Heat. See BOILERS, Waste-Heat.

Water Circulation. Studies of Water Circulation in Vertical-Tube Boilers (Studien über Wasserumlauf in Steilrohrkesseln), Schirmer. Wärme, vol. 47, no. 8, Feb. 22, 1924, pp. 73-76, 12 figs. Observations made on two model boilers from heating until first production of steam, with uniform and varying steam generation; conclusions from results obtained.

BOLTS

Flange, Initial Tension in. Effect of Initial Tension in Flange Bolts, M. D. Casler. Am. Mach., vol. 60, no. 10, Mar. 6, 1924, pp. 369-370, 1 fig. Mathematical treatment for determination of stresses in bolts under various load conditions; method of deriving formulas; numerical example to illustrate solution.

Standardization. International Standardization of Bolts and Nuts. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, p. 314. Account of conference held in New York under auspices of Am. Eng. Standards Committee, at which representatives of German, Czecho-Slovakian, and American national standardizing bodies were present.

Tension Calculation. Charts for Tension in Bolts and Torsion in Shafts, E. Patterson. Am. Mach., vol. 60, no. 11, Mar. 13, 1924, pp. 401-402, 2 figs. Two simple alignment charts intended to provide quick solutions for problems in stresses.

BOMBING

Aerial. Aerial Bombing, A. H. Hobley and H. B. Inglis. Mech. Eng., vol. 46, no. 6, June 1924, pp. 309-316, 8 figs. Early practice and conditions; bombing moving targets; theory of bomb trajectory; principles of various sights; ground-speed determination; sources of error and methods of overcoming them.

Aerial Bombing. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 542-545, 1 fig. Further information on subject, dealing with damaging distances for various sizes of bombs, yawing and sight stabilization, tactical requirements for service bomb sights, etc.

BOMBS

Aircraft. Modern Aircraft Bombs and their Use. Aviation, vol. 16, no. 15, Apr. 14, 1924, pp. 390-393, 2 figs. Importance of bomb sights; how a bomb drops; successful bomb sights; errors in bombing; altimeter errors; influence of bank on bomb; bomb-carrying and releasing devices; heavy demolition bombs; 300-lb. bomb rack; safety device; anti-battleship bombs.

Design. Bombs, W. A. Borden. Army Ordnance, vol. 4, nos. 22, 23, and 24, Jan.-Feb., Mar.-Apr., and May-June 1924, pp. 209-218, 324-327, and 391-394 and 408, 29 figs. Bomb design; bomb carrying devices; bomb ballistics; types of bombs; discusses fragmentation, demolition, anti-submarine, torpedo, antiaircraft, sub-caliber, incendiary, and smoke bombs; bomb fuses.

BONUS SYSTEMS

Boiler-Room. See BOILER OPERATION, Control.

Efficiency Bonus. The Efficiency Bonus as a Combined Group and Individual Incentive, T. C. Eckstein. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 105-106, 1 fig. Method of paying bonus which has value of rewarding all workers who contributed to production with increased effect of having individual reward to those who could affect production seriously by their individual efforts.

Foremen. Making a Bonus System Pay Dividends, A. W. Rowley. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 357-361. Describes design and operation of bonus system which encourages coöperation between foremen; consists of production, cost-reduction, and suggestion bonus.

The Safety Bonus in Metal Mining, F. C. Gregory. U. S. Bur. Mines—Reports of Investiga-

tions, serial no. 2617, June 1924, 3 figs. Discusses safety bonus, paid to foremen or bosses for keeping accident rate down to specified minimum, applied also to coal mining, oil-field work, and other mineral industries.

Fuel Saving. Saving Fuel by Bonus System (Economies de combustible réalisées par l'application d'un système de primes), H. Benner. Chaleur & Industrie, vol. 5, no. 55, Nov. 1924, pp. 579-585, 3 figs. Discusses a premium system for economic operation of machinery and fuel saving, being payment of bonuses proportional to pay per hour.

Maintenance of. Maintenance of a Standard Time and Bonus System, C. W. Setter. Soc. Indus. Engrs.—Bul., vol. 6, no. 7-8, July-Aug. 1924, pp. 10-14. Details as practiced at works of Republic Metalware Co., Buffalo, N. Y.

Power-Plant. See STEAM POWER PLANTS, Bonus Systems for.

Practical Application. Applying the Bonus System to Diversified Operations, Chas. E. Bassett. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 47-51, 5 figs. Practical wage-incentive plant.

Tool-Room Application. Bonus System Applied to Tool Department. Iron Age, vol. 114, no. 19, Nov. 6, 1924, p. 1219. Bonus system for tool-room use; making of dies expedited with resultant lower cost.

United Verde Copper Co., The United Verde Copper Company's Bonus Mehtods, W. V. DeCamp. Min. Congress Jl., vol. 10, no. 12, Dec. 1924, pp. 541-549, 3 figs. General discussion of bonus methods, and detailed interpretation of application of bonus methods to plant of United Verde Copper Co. This plant has applied bonus system with particularly satisfactory results both in labor and management.

BORAX

Deposits, California and Nevada. The World's Biggest Borax Deposits, W. F. Foshag. Eng & Min. Jl.-Press, vol. 118, no. 11, Sept. 13, 1924, pp. 419-421, 6 figs. Describes deposits in desert areas of California and Nevada.

BOREHOLES

Measuring Devices. A New Device for Measuring the Obliquity of Boreholes (Ein neuer Bohrlochneigungsmesser), O. Martienssen. Petroleum, vol. 20, no. 14, May 10, 1924, pp. 595-603, 14 figs. Describes a method and an equipment for measuring angularity of drill holes.

Springing. Springing Bore Holes Correctly, C. S. Hurter. Cement & Eng. News, vol. 36, no. 7, July 1924, pp. 22-23. Recommendations for increasing efficiency and insuring safety of quarry operation.

Surveying. Borehole Surveying by the Kiruma Method, S. Lundberg. Eng. & Min. Jl.-Press, vol. 117, no. 17, Apr. 26, 1924, pp. 690-693, 8 figs. Describes reliable method for measuring deviations in drill holes, developed and, it is claimed, successfully used in Sweden, employing electrolytic deposition of copper instead of etching by acid.

BORING MACHINES

Cylinder. The Early History of the Cylinder Boring Machine, E. A. Forward. Engineer, vol. 138, nos. 3599 and 3600, Dec. 19 and 26, 1924, pp. 686-687 and 714-715, 7 figs. Review of early developments, from which it would appear that by about 1830 the cylinder boring machine had arrived at its final form, and main principle of machine is due to Wilkinson.

Multiple-Spindle. Boring and Tenoning Machines. Engineering, vol. 118, no. 3061, Aug. 29, 1924, pp. 297-298, 8 figs. partly on p. 296. Describes combined vertical hollow-chisel mortising and multiple-spindle boring machine, and small tenoning machine.

Multi-Spindle Attachment for Horizontal. Multi-spindle Attachment for Horizontal Boring Machine, H. C. Town. Machy. (Lond.), vol. 25, no. 627, Oct. 2, 1924, pp. 15-16, 3 figs. Attachment for covering horizontal boring machine into multiple-spindle machine for operating simultaneously on bores of gear cases or cylinder blocks.

Semi-Automatic Chain-Cutter. A New and Improved Mortising and Boring Machine. Ry. Gaz., vol. 41, no. 22, Nov. 28, 1924, pp. 702-703, 2 figs. Machine is specially adaptable to needs of railway-car building shops. Built by J. Sagar & Co., Halifax.

BORING MILLS

Giant. Giant Boring Mill Built in Canada. Iron Age, vol. 113, no. 21, May 22, 1924, pp. 1508-1510, 7 figs. Machine of unusual size for use in manufacture of electrical generating equipment; massive design and convenient control.

Tires. New Tire-Boring Machine. Engineer, vol. 137, no. 3553, Feb. 1, 1924, pp. 126-127, 6 figs. New type of machine for boring and recessing locomotive and car tires.

BORNITE

Furnace Product. Bornite as a Furnace Product, F. N. Guild. Am. Mineralogist, vol. 9, no. 10, Oct. 1924, pp. 201-205. From consideration of stated facts, it would seem that bornite has developed both from condition of dry fusion and lower temperature conditions; transformations may all roughly be grouped under term of unmixing.

BOXES

Fiber Shipping Cases. Fiber Shipping Case Economies, Wm. A. Vollmer, Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 187-193, 10 figs. Notes on standardization of packing; coördinating speed of production and packing; machinery for making packing; demonstration of best design; corrugated containers.

Manufacture. Applying Machine Shop Methods to a Woodworking Job, D. A. Hampson. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 52-55, 2 figs. Describes method employed in machine shop for making specially designed box.

Shipping Containers. Formulas for Shipping Box Construction, M. L. Oglesby. Mgmt. & Administration, vol. 7, no. 3, Mar. 1924, pp. 323-328, 8 figs. Forces acting and sizes of material required to withstand them.

BRAKES

Air. Air Brake Association Meets at Montreal. Ry. Age, vol. 76, no. 23, May 10, 1924, pp. 1149-1154, 4 figs. Report on passenger-train handling: coördinating throttle and brake valve; slack adjustment; graduated release. Report, by J. P. Stewart, on interesting employees in study of air brakes.

Air Brake Investigation by I. C. C. Completed. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 521-523. See also Ry. Age, vol. 77, no. 7, Aug. 16, 1924, pp. 296-297. Report of Interstate Commerce Commission investigation on power brakes for both passenger and freight trains. Adoption of more complete specifications for maintenance and operation are recommended.

I. C. C. Continues the Brake Investigation. Ry. Age, vol. 76, no. 10, Mar. 8, 1924, pp. 551-554. Am. Ry. Assn. observers disagree with Bur. of Safety report on Norfolk & Western tests of automatic straight air brakes.

The Air Brake Problem. Car Foremen's Assn. of Chicago—Proc., May 1924, pp. 15-35 and (discussion), 35-55. Deals with maintenance, discussing fundamentals of air brakes to the end that proper significance be applied to relative parts.

A. R. A. Committee Report. Report on Brakes and Brake Equipment. Ry. Age (Daily Edition), vol. 76, no. 36, June 19, 1924, pp. 1729-1730, 5 figs. Failure of brake-beam hangers; 12-in. air-brake equipment; recommendations.

Automobile. See AUTOMOBILES, Brakes; Four-Wheel Brakes; Braking.

Electrically-Operated. Construction of Brakes Used to Retard or Hold Rotating Parts, A. J. Whitcomb. Indus. Engr., vol. 82, no. 6, June 1924, pp. 271-274 and 304-305. Details of construction, operation, and maintenance of electrically operated brakes.

Freight-Train. See Hand.

German-Railway Trials. Brake Trials on the German State Railways. Ry. Gaz., vol. 41, no. 17, Oct. 24, 1924, pp. 550-554, 10 figs. Tests made for demonstrating capabilities of newly developed brake apparatus for express trains; trials took place between Grunewald, near Berlin, and Belzig, and vice versa, with trains of heavy coaches hauled by two 4-6-0-type locomotives.

Hand. Getting Full Value from Hand Brakes on Air-Brake Cars, J. S. McWhirter. Elec. Ry. Jl., vol. 64, no. 11, Sept. 13, 1924, pp. 383-385, 2 figs. As auxiliary to air-brake equipments hand-brake parts should be designed and maintained so that full braking pressure, equivalent to that supplied by air-brake cylinder, will be available throughout entire travel of piston.

Hand Brakes on Goods Trains, E. Choquet. Int. Ry. Congress Assn.—Bul., vol. 6, no. 3, Mar. 1924, pp. 220-238, 5 figs. Solution of problem of hand brakes for goods trains which consists in determining, for a train of any composition, weight which must be braked in order that stops may be made from any given speed within a certain distance, gradients of line being taken into consideration.

Machining. See MILLING, Brakes.

Operation. See BRAKING.

Passenger-Train. Passenger Train Handling. Ry. & Locomotive Eng., vol. 37, no. 7, July 1924, pp. 219-222, 4 figs. Discusses brake effect from brake pipe reduction, graduated release, and mountain-grade braking.

See also Air.

Power. A Review of Power Brake Operation and the Results Obtained on the Southern Pacific, J. Kruttschnitt. Ry. & Locomotive Eng., vol. 37, no. 3, Mar. 1924, pp. 72-74. Developed in testimony before Interstate Commerce Commission.

Power Brakes on British Railway, W. E. Symons. Ry. & Locomotive Eng., vol. 37, no. 9, Sept. 1924, pp. 281-282, 2 figs. Reviews power-brake situation in Great Britain; vacuum and air brakes.

The Commission's Report on Power Brakes. Ry. Rev., vol. 75, no. 7, Aug. 16, 1924, pp. 251-257. Mandatory conclusions enunciated by Interstate Commerce Commission as result of its extended investigation of power brakes and appliances.

See also Air.

Switching Service. Improving the Gravity Switching Service by Better Braking (Verbesserung des Schwerkraft-Verschiebedienstes durch verbesserte Bremstechnik), Wenzel. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 38, Sept. 20, 1924, pp. 986-990, 16 figs. Details of Thyssenhütte gravity braking device for railway switching service in which braking action is exerted on wheels by means of braking rails at each side of rail which are actuated by weight of cars passing.

Track. "Thyssenhütte" Track Brake at the Cologne-Nippes Railway Station (Die Gleisbremse "Thyssenhütte" auf Bahnhof Köln-Nippes), Derikartz. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 15, Nov. 15, 1924, pp. 341-344, 12 figs. partly on supp. plate. Design and operation of brake consisting of rails applied at each side of both wheels, used in shunting cars to eliminate damage by colliding of cars.

Train. The Braking of Railway Trains With Counter Steam (Das Bremsen von Zügen durch Gegendampfgeben). Hanomag-Nachrichten, vol. 11, no. 123, Jan. 1924, pp. 10-12, 2 figs. Theoretical calculation of braking action of counter steam and its limitation by adhesive forces between wheels and rails.

Vacuum. Vacuum Brakes for Electric Rolling Stock (Freinage par le vide du materiel des chemins de fer à traction électrique), J. Netter. Technique Moderne, vol. 16, no. 17, Sept. 1, 1924, pp. 577-582, 8 figs. Design and construction of automatic vacuum brakes, and application to electric locomotives.

See also Power.

BRAKING

Automatic Valve Operation. Improvement of Air Apparatus in Train Control. Ry. Age, vol. 76, no. 7, Feb. 16, 1924, pp. 425-427, 3 figs. Indiana Equipment Corpn. develops valves to give graduated reduction of brake-pipe pressure.

Pneumatic. Hump Yard Operates Without Car Riders. Ry. Age, vol. 77, no. 20, Nov. 15, 1924, pp. 895-898, 8 figs. All car riders have been eliminated on north hump of Indiana Harbor Belt freight classification yard at Gibson, Ind., as result of installing pneumatic braking system.

Rail-Brake Apparatus for Freight Yard. A New System of Braking Wagons in Gravity Shunting Yards. Ry. Gaz., vol. 41, no. 18, Oct. 31, 1924, pp. 575-578, 8 figs. System, which has been laid down at several points on German State railways, has as its basis hydraulically operated braking apparatus applied at track level from operating tower.

Regenerative. The Characteristics of a D. C. Series Machine Self-Excited by Rectified Current for Purposes of Regenerative Control, R. D. Archibald. Instn. Elec. Engrs.—Jl., vol. 62, no. 327, Mar 1924, pp. 233-242, 11 figs. Discusses present position of regenerative control for street cars and describes method of self-exciting field of series motor with low-voltage rectified current transformed from a.c. tappings in armature; calculations for finding conditions of sparkless commutation of rectifier, and tests which corroborate calculations; practical application of device.

BRASS

[See also COPPER ALLOYS, Copper-Zinc; NON-FERROUS METALS.]

Annealing, Effect of. Effect of Anneal on Brass Surfaces, J. L. Christie. Iron Age, vol. 113, no. 11, Mar. 13, 1924, pp. 783-785, 6 figs. High ductility obtained only by losing smoothness; grain size under microscope a measure of both ductility and amount of annealing.

Brittle Ranges. The Brittle Ranges in Brass as Shown by the Izod Impact Test, D. Bunting. Inst. Metals—Advance paper no. 2, for meeting Mar. 12-13, 1924, 22 pp., 15 figs. Investigates (1) brittle ranges of brass varying in composition from 100 to 50 per cent copper; (2) effect of rapid cooling on brittle ranges; (3) cause of brittle ranges.

Cadmium in, Estimation of. The Estimation of Cadmium in Brass, A. T. Etheridge. Analyst, vol. 49, no. 585, Dec. 1924, pp. 572-576. Describes use of electrolytic methods which is said to have great advantages over chemical methods.

Constitution. The Constitution of Brass (Zur Konstitution des Messings), G. Masing. (Zeit. für Metallkunde, vol. 16, no. 3, Mar. 1924, pp. 96-98, 9 figs. partly on supp. plate. Points out that β-brass is formed below 470 deg. cent. through diffusion and is therefore constant at lower temperatures; the Carpenter diagram of state, it is claimed, does not hold true.

Corrosion. See COPPER, Corrosion.

Dezincification. A Further Study of the Dezincification of Brass, C. F. Nixon. Am. Electrochem. Soc.—Advance paper no. 3, for meeting Apr. 24-26, 1924, pp. 29-41, 2 figs. From experimental evidence it is concluded that, with exception of 90 per cent, or more, copper alloys, commercial brasses are subject to dezincification.

Extrusion of Rod. See EXTRUSION OF METALS, Brass Rods.

Foundries. See FOUNDRIES, Brass.

Foundry Mixtures, Nickel Additions to. The Advantage of Nickel Additions to Brass Foundry Mixtures, W. M. Corse. Metal Industry (Lond.), vol. 25, no. 3, July 18, 1924, pp. 79-80. Discusses advantages of nickel additions and gives typical examples of benefit derived.

Heat Treatment. Experiments on the Heat Treatment of Alpha-Beta Brass, O. W. Ellis and D. A. Schemmitz. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1348-N, July 1924, 11 pp., 2 figs. and (abstract) Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 593-594. Details of experiments carried out mainly with view to determining whether precipitation of soft particles within a supersaturated solid solution would not enhance its hardness. Effect of reheating quenched alpha-beta brass on its microstructure; results of reheating quenched alpha-beta brass at 100 deg., 200 deg. and 300 deg. cent.; aging at room temperature.

Relation of Heat Treatment, Mechanical Properties, and Microstructure of 60-40 Brass, V. O. Homerberg and D. N. Shaw. Am. Inst. Min. & Met. Engrs.—Trans., no. 1334-N, Mar. 1924, 10 pp., 16 figs. Results obtained when test pieces were given a double heat treatment and then tested for mechanical properties, and microstructure studied.

Relation of Heat Treatment to the Microstructure of 60-40 Brass; R. S. Williams and V. O. Homerberg. Am. Inst. Min. & Met. Engrs. —Trans., no. 1305-N, Mar. 1924, 15 pp., 40 figs. Description of a double heat treatment of 60-40 brass; gives photomicrographs showing changes that take place in microstructure on reheating water-quenched specimens.

Lead and Tin, Influence of. Lead and Tin in Brass (Blei and Zinn im Messing Ms 60), K. Hanser. Zeit. für Metallkunde, vol. 16, no. 3, Mar. 1924, pp. 91-95, 7 figs. Based on existing investigations and author's own tests, influence of lead and tin on strength, elongation, shrinkage, hardness, and hot and cold working of 60-40 brass is shown.

Melting. See ELECTRIC FURNACES, Brass.

Plates, Casting. See CASTING, Brass.

Pressed. Pressed Brass in Place of Red Bras and Bronze for Metal Parts of High Load (Pressmessing anstelle von Rotguss und Bronzen für hochbeanspruchte Metallteile), Peter. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1071-1074, 9 figs. Discusses tensile strength, machinability, conductivity, economic production and uses.

Properties, Determination of. Methods of Determining Physical Properties of Brass, A. A. Baldwin. Brass Wld., vol. 20, no. 3, Mar. 1924, pp. 77-79, 9 figs. Physical properties of brass, and tests for each.

Season Cracking. Cracking of Brass Due to Internal Stresses (Das Aufreissen von Messing durch innere Spannungen), G. Masing. Zeit. für Metallkunde, vol. 16, nos. 7 and 8, July and Aug. 1924, pp. 257-264 and 301-307, 10 figs. Discusses cracking or splitting of brass due to internal stresses caused by cold working; annealing to avoid it; connection between internal stresses and compression or deformation.

Season Cracking of Brass and Bronze (Om självsprickor i gulmetall), O. Forsman. Teknisk Tidskrift, vol. 54, no. 42, Oct. 18, 1924, pp. 115-120 (Mekanik), 5 figs. This cracking, according to author, is produced either by excessive cold working of metal or by impurities. Annealing is proper remedy. Bibliography.

Sheet, Purchasing of. Ordering the Right Kind of Sheet Brass, J. L. Christie. Metal Industry (N. Y.), vol. 22, no. 2, Feb. 1924, pp. 69-70, 6 figs. Mistakes that are made by purchasers in ordering sheet brass; how to specify desired grades for various requirements.

Special. Special Brasses (Bronze Substitutes) [Ueber Sondermessing (Ersatz für Bronze)], P. Reinglass. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1090-1092. Discusses steel-bronze (Cu 52-59 per cent, Z 36-43 per cent, Mn 2.5-3 per cent, Fe 1 per cent, Al 1 per cent), manganese bronzes, including deltametal and durnametal. Effect of additions of Al, Fe, and Ni on brass.

Tubes, Fatigue Failure. See METALS, Fatigue of.

Welding. See ELECTRIC WELDING, ARC, Copper, OXY-ACETYLENE WELDING, Brass.

BRASS FOUNDRIES

British. Impressions of British Brass Foundries, T. Harper. Metal Industry (N. Y.), vol. 22, no. 2, Feb. 1924, pp. 60-63. British efficiency as seen by an American brass foundryman and jobbing foundry operator.

Improving Conditions in. Humanizing Brass Foundries, Chas. Vickers. Foundry, vol. 52, no. 5, Mar. 1, 1924, pp. 185-189, 5 figs. Points out that unattractive features often serve to deter men from taking up brass casting work; suggests eliminating noise and fumes.

Operation of. The Operation of a Brass Foundry under Scientific Control, F. W. Rowe. Foundry Trade Jl., vol. 29, no. 399, Apr. 10, 1924, pp. 291-294 and (discussion) 294-296, 5 figs. Layout of brass foundries, provision of suitable stores, recording stocks, charge sheets, inspection of castings of new design, melting and casting procedure, casting temperature, etc.

Record Keeping. Controlling Brass Shop Detail, F. W. Rowe. Foundry, vol. 52, no. 6, Mar. 15, 1924, pp. 226-229, 7 figs. Close tab on weights, mixtures and other data is checked on operations in non-ferrous foundry; charts shown which help to record operations and metal compositions and properties.

BRASSES

Babbitting. See BEARINGS, Brasses, Babbitting.

BRAZING

Production. Production Brazing, B. Heyman. Welding Engr., vol. 9, nos. 3, 5 and 6, Mar., May and June 1924, pp. 19-21, 19-21 and 17-20, 9 figs. Underlying principles. Description of devices and methods employed in carrying through

a series of machine-brazing operations on a single product in which numerous difficulties were encountered both from an engineering standpoint in design and also from operating standpoint in shop.

BREAKWATERS

Sand-Filled Caissons. The Breakwater at Helsingborg (Sweden) (Der Wellenbrecher bei Helsingborg). Bauingenieur, vol. 5, no. 1, Jan. 15, 1924, pp. 4-5, 5 figs. Construction details of breakwater 340 m. long, consisting of 13 reinforced-concrete caissons filled with sand.

BREATHING APPARATUS

[See also MINE-RESCUE APPARATUS.]

Carbon-Monoxide. Observations on Respirators for Absorbing Carbon Monoxide, J. I. Graham. Iron & Coal Trades Rev., vol. 109, no. 2065, Dec. 26, 1924, pp. 1046-1047. Results of tests carried out on two types of carbon-monoxide respirators, viz., Burrell All-Service Canister No. CO-10 and M.S.A. "Self-Rescuer," to ascertain their efficiency under conditions of hard work and during rest. Abstract of paper read before S. Staffordshire and Warwickshire Inst. Min. Engrs.

Diving. Diving Apparatus (Le scaphandre autonome). Nature (Paris), no. 2613, May 3, 1924, pp. 275-279, 7 figs. Portable apparatus designed by M. Boutan, permits diver to remain several hours under water without making use of habitual pump and tube.

Liquid-Air. Mines Rescue Apparatus; Empire Exhibition. Engineering, vol. 117, no. 3045, May 9, 1924, p. 619, 4 figs. Apparatus exhibited by Guest & Chrimes uses liquid air in distinction from other types using compressed oxygen.

Mines, Application in. Application of Breathing Apparatus in Mines, J. A. S. Ritson. Colliery Guardian, vol. 127, nos. 3307 and 3308, May 16 and 23, 1924, pp. 1249 and 1318. Discusses way rescue or recovery operations should be carried out at a mine following an explosion or underground fire, and organization that should be established at a colliery prior to and after an explosion or underground fire. From paper read before Leeds Univ. Min. Soc.

Oxygen, for Aviators. Oxygen-Breathing Apparatus for Aviators. Engineering, vol. 117, no. 3042, Apr. 18, 1924, p. 506, 3 figs. Describes two types of apparatus, one carrying oxygen in liquid form in vacuum-walled metal vessel; other with steel container for carrying oxygen gas at pressure of 120 atmos.

Self-Contained. Notes on Self-Contained Breathing Apparatus in Nova Scotia, J. McMahon. Can. Inst. Min. & Metallurgy—Monthly Bul., no. 152, Dec. 1924, pp. 837-851. Description of each type and results of tests; efforts of Brit. Empire Steel Corpn. to secure most modern type of apparatus. See also article entitled, Practical Use of Self-Contained Breathing Apparatus, A. McEachern, pp. 852-857.

The Practical Use of Self-Contained Breathing Apparatus, A. McEachern. Can. Min. Jl., vol. 45, no. 38, Sept. 19, 1924, pp. 922-924, 1 fig. Describes various methods of using rescue breathing apparatus. Abstract of paper read before meeting of Min. Soc. of Nova Scotia.

Self-Rescuer. The Carbon Monoxide Self-Rescuer, A. C. Fieldner, S. H. Katz and D. A. Reynolds. U. S. Bur. Mines—Reports of Investigations, no. 2591, Apr. 1924, 10 pp., 5 figs. on supp. plates. Describes construction and details of M.S.A. self-rescuer, a pocket-size respirator which protects wearer from air contaminated with poisonous carbon monoxide gas, and discusses its performance under test conditions.

Types. New Auxiliary Apparatus for Mine Rescue Work (Neuere Hilfsgeräte im Grubenrettungswesen), Tübben. Braunkohle, vol. 23, no. 37. Dec. 13, 1924, pp. 691-695, 3 figs. Describes Audos, Inhabad, and other types of respirators.

BRICK

Manufacture. See BRICKMAKING.

Porosity Determination. A Simple Brick Porosimeter, E. E. Pressler. Am. Ceramic Soc.—Jl., vol. 7, no. 3, Mar. 1924, pp. 154-159, 1 fig. Describes a brick porosimeter based upon air-expansion principle for determining open pore space, and discusses various considerations of design. Adapted for testing refractory brick. Porosity values obtained by porosimeter and water absorption methods are compared to values calculated from true specific gravity, to indicate relative accuracy of methods. (Pub. by permission U. S. Bur. mines).

Refractory, Porosity and Specific Gravity of. Comparative Tests of Porosity and Specific Gravity on different Types of Refractory Brick, E. E. Pressler. Am. Ceramic Soc.—Jl., vol. 7, no. 6, June 1924, pp. 447-451. Results obtained. Apparent porosity is obtained directly by water absorption and air expansion methods. Total porosity is calculated from true specific gravity and apparent specific gravity is calculated from observed porosity values. Pub. by permission U. S. Bur. Mines.

Sand-Lime. Recommended Specification for Quicklime and Hydrated Lime for Use in the Manufacture of Sand-Lime Brick. U. S. Bur. Standards—Circular no. 150, Dec. 28, 1923, 6 pp. Brief description of way in which lime is used in manufacture of sand-lime brick, and general statement as to quality of lime required; directions for sampling and testing.

Silica-Lime. See MOLER, Properties and Uses.

Slag. See SLAG, Blast-Furnace.

Transverse Tests. Equalizer Apparatus for Transverse Tests of Bricks, H. L. Whittemore. U. S. Bur. Standards—Technologic Paper no. 251, Feb. 5, 1924, pp. 107-113, 6 figs. Describes new apparatus for transverse tests of building bricks; designed to insure proper loading, even if surfaces of brick are warped or irregular, and to maintain proper distance and alignment of bearings. Time required for testing with this apparatus was found to be about 58 per cent of that required with A.S.T.M. apparatus.

BRICKMAKING

Georgia Kaolins. Utilization of Georgia Kaolins in the Manufacture of Face Brick, R. T. Stull and G. A. Bole. Am. Ceramic Soc.—Jl., vol. 7, no. 5, May 1924, pp. 347-358. Details of tests made showing that light cream and light gray face brick can be made from Georgia kaolin, aplite and sand.

Holland. Brickmaking in Holland. Clay-Worker, vol. 82, no. 1, July 1924, pp. 19-26, 12 figs. Describes clay banks, their origin and extent; making of brick, setting and burning, burning of brick with turf, and drawing.

Kilns. See KILNS, Brick; Tunnel.

Materials Handling. Economy in Handling Materials in Brick Manufacture—Baltimore Plant, C. B. Bryant. Concrete, vol. 24, no. 3, Mar. 1924, pp. 97-100, 12 figs. Describes equipment and practice of Arundel-Shope Brick Co., Baltimore, Md.

Sand-Lime Brick. Heat Economy in Sand-Lime Brick Yards (Wärmewirtschaft in Kalksandsteinfabriken), Chr. Eberle. Tonindustrie-Zeitung, vol. 48, nos. 26 and 27, Mar. 29 and Apr. 1, 1924, pp. 279-281 and 289-290, 6 figs. Comparative figures of steam consumption for a production of 1,000

bricks for various methods of operation and in two different plants.

The Utilization of Spent Shale. Oil Eng. & Finance, vol. 5, no. 104, Dec. 1924, pp. 676-678, 4 figs. Discusses methods for manufacture of bricks on sand-lime (calcium-silicate) principle, for efficient utilization of spent shale residues.

Tunnel Kilns. See KILNS, Tunnel.

BRICKYARDS

Materials Handling in. See MATERIALS HANDLING, Brick Plants.

BRIDGE CONSTRUCTION

Steel Bridges. See BRIDGES, STEEL, Construction.

BRIDGE DESIGN

Arches, Calculation of. Design of Arch-thickness for Masonry Arched Bridges, K. D. Joshi. Mysore Engrs.' Assn.—Bul., vol. 2, no. 1, Jan.-Mar. 1924, pp. 22-32, 5 figs. Graphic method of testing arch thickness.

Determination of the Size of Arches (Considerazioni sulla determinazione della grossezza delle volte), C. Ceradini. Annali dei Lavori Pubblici, vol. 62, no. 7, July 1924, pp. 641-656, 10 figs. Calculation of symmetric arches of bridges, symmetrically loaded, with circular intrados.

Concrete Bridges. See BRIDGES, CONCRETE, Design.

Developments and Prospects. Bridge Engineering, Gustav Lindenthal. Eng. News-Rec., vol. 92, no. 16, Apr. 17, 1924, pp. 652-657, 18 figs. Author considers what have been distinctive features in progress of design and construction of bridges in different countries during last 50 years, and prospect for future.

Pedestrian River Crossing. Contest to Obtain Tentative Plans for the Erection of a Crossing over the Weser River in Bremen (Der Ideenwettbewerb zur Erlangung von Vorentwürfen für die Herstellung einer Verkehrsanlage über die Weser in Bremen), M. Contag. Bautechnik, vol. 2, no. 12, Mar. 18, 1924, pp. 89-100, 13 figs. Conditions called for structure crossing Weser River to accommodate about 2,000,000 pedestrians annually; details of prize-winning and purchased plans, including plans for steel bridges, aerial ferries and lift bridges.

Plate-Girder Bridges. See BRIDGES, RAILWAY, Steel.

Rhine River. Notes on the Construction of Railway Bridges Over the Rhine, R. Desprets. Int. Ry. Congress Assn.—Bul., vol. 6, no. 7-8, July-Aug. 1924, pp. 495-552, 91 figs. Short account of railway bridges over Rhine from Dutch frontier up to Worms, describing direct methods employed in designing these consecutive bridges, very instructive evolution in ideas that prompted their general design, and various details of their construction.

Steel Bridges. See BRIDGES, STEEL, Design.

Stresses in Girders. The Interaction in Bridgework of the Deck System on the Main Girders and the Consequent Modification of Stresses Therein, D. H. Remfry. Engineering, vol. 117, no. 3038, Mar. 21, 1924, pp. 380-381. (Abstract.) Paper read before Instn. Civ. Engrs.

BRIDGE ERECTION

Arch Closure. Closing 640-Ft. Michigan Central Arch Over Niagara Gorge. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 716-718, 3 figs. Cantilevered halves lowered to junction by 39-in. jacks in backstays; centralized jacking control facilitates operation.

Cantilevering. Cantilevering a Heavy Bridge Span In Northern Quebec, J. P. Chapleau and C. M. Goodrich. Eng. News-Rec., vol. 93, no. 3, July 17, 1924, pp. 94-95, 2 figs. Special conditions surrounding construction of a railway bridge across Saguenay River led to a remarkable use of cantilever erection method. A 220-ft. double-track span was cantilevered for its full length from a 90-ft approach span, because of rapid current in river. Construction data.

Erecting by Longitudinal Rolling. Erecting a Bridge in Palestine by Longitudinal Rolling, P. W. Etkes. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 16-17, 6 figs. Steel deck span, 165 ft. long and weighing 120 tons, of Yarmuk River railway bridge was transported to site in sections, erected on bank, and moved into place by longitudinal rolling.

Falsework, Elimination in. Erecting Seven Simple Spans Without Falsework. Ry. Age, vol. 77, no. 15, Oct. 11, 1924, pp. 630-632, 4 figs. Describes how Union Pacific replaces Howe trusses in Columbia River Bridge; new bridge consists of three 192-ft. through trusses, three 242-ft. through trusses, three 90-ft. through plate girders, 280-ft. center bearing swing span, 304-ft and 418-ft. trestle approaches.

Skew Bridge. Skew Bridge for Fly-Over Junction at Chicago: I.C.R.R. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 748-750, 5 figs. Bridge replaces main track grade crossing; ball bearings for girders; derrick cars place long heavy girders.

BRIDGE PIERS

Bracing. Causes of Deformation of Stone Piers of the Sitter Viaduct of the Bodensee-Toggenburg Railroad (Ueber die Ursachen der Verbiegungen der steinernen Pfeiler am Sitterviadukt der Bodensee-Toggenburgbahn), M. Ros. Schweizerische Bauzeitung, vol. 83, nos. 25 and 26, June 21 and 28, 1924, pp. 287-289 and 301-304, 19 figs. Discusses loading tests and calculations made to determine necessary bracing to be carried out.

Cofferdam Wreckage. Cofferdam Wrecked by Splitting of Concrete Seal, C. B. McCullough. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 460-461, 3 figs. Foundation for bridge pier in Oregon damaged by remarkable accident attributed to effect of heavy storm.

Construction. Foundations for Bridges in Pueblo Flood Control Project (Colo.). Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924, pp. 903-905, 5 figs. Diversion requires 8 new bridges; substructures in main channel built in caissons sunk to rock.

Hollow Concrete. Hollow Concrete Bridge Piers Built Like Chimneys. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, p. 757, 3 figs. Piers 181 ft. and 221 ft. high of reinforced concrete to carry highway bridge over Dix River gorge.

Renewal. Bridge Spans Rolled 43 ft. Endwise to Place Them on New Piers. Ry. Eng. & Maintenance, vol. 20, no. 4, Apr. 1924, pp. 150-151, 5 figs. Substructure of Des Moines River bridge of Santa Fe renewed in novel manner.

Steel-Encased Reinforced-Concrete. Work on Rigolets Bridge Is Progressing Rapidly, W. H. Courtenay. Ry. Age, vol. 76, no. 16, Mar. 22, 1924, pp. 777-780, 8 figs. Unique pier construction adopted by Louisville & Nashville to resist effect of gulf storms; constructed of reinforced concrete placed inside of steel shell.

BRIDGES

Abutments. See ABUTMENTS.

Arches. See ARCHES.

Bascule. See BRIDGES, LIFT, Bascule.

Concrete. See BRIDGES, CONCRETE.

Construction. See BRIDGE CONSTRUCTION.

Design. See BRIDGE DESIGN.

Erection. See BRIDGE ERECTION.

Lift. See BRIDGES, LIFT.

Melbourne, Australia. Melbourne's Bridges, J. T. Noble Anderson. Civ. Eng., vol. 1, nos. 2, 3, 4, and 5, Aug. Sept., Oct. 15, and Nov. 15, 1924, pp. 45-48, 73-76, 109-112, and 144-147 15 figs. Aug.: Aethetic viewpoint. Sept.: Ornamentation. Oct. 15: Bridge sites. Nov. 15: Location.

Movable. See BRIDGES, MOVABLE.

Piers. See BRIDGE PIERS.

Pontoon. See BRIDGES, PONTOON.

Railway. See BRIDGES, RAILWAY.

Reaction Measurements. See MEASURING INSTRUMENTS, Bridge Loads.

Roller Bearings for. See BEARINGS, ROLLER, Bridge.

Steel. See BRIDGES, STEEL.

Suspension. See BRIDGES, SUSPENSION.

Sydney Harbor Bridge. Sydney Harbour Bridge. Indus. Australian & Min. Standard, vol. 72, nos. 1868, 1869, 1870, and 1871, Sept. 25, Oct. 2, 9, and 16, 1924, pp. 466-469, 505-509, 539-541, and 573-575, 12 figs. Report on tenders, which were called for cantilever and arch bridges only, but tenders submitted for suspension bridges were given same consideration as the others; tendered cost and type of bridge; engineering aspects governing choice of type.

The Competitive Designs for the Sydney Harbour Bridge. Engineering, vol. 118, no. 3056, July 25, 1924, pp. 129-132, 18 figs. Discussion of the different designs submitted for construction of Sydney Harbor Bridge. Proposals are of five general types, viz., arch, cantilever-arch, cantilever, suspension, and cantilever-suspension.

Trestles. See TRESTLES.

Viaducts. See VIADUCTS.

BRIDGES, CONCRETE

Abutments. See ABUTMENTS, Concrete Bridge.

Arch. Building a Concrete Arch Around an Old Iron Bridge, E. H. Harder. Eng. News-Rec., vol. 92, no. 8, Feb. 21, 1924, pp. 320-323, 7 figs. Lower chord used for rib reinforcement and upper chord for concrete floor forms; trestle approach designed as continuous structure with considerable saving.

California Begins Construction of Douglas Memorial Bridge, H. D. Miller. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 506-567, 1 fig. Design considerations, physical features, pier design, and loading of half-million-dollar memorial bridge to be constructed over Klamath River in northern California; will consist of five 210-ft. open-spandrel reinforced-concrete arch spans, supported on a wood-pile foundation.

Concrete Bridge with Longest Arch Completed in France. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 476-479, 4 figs. Clear span of 432.44 ft. provided in structure bridging Seine River near Rouen; twin ribs of large section are hollow; precast floor beams hung from arch by concrete-encased steel hangers. See also editorial on p. 474.

Design and Construction of the Hill-to-Hill Bridge, Bethlehem, Pa., F. W. Skinner. Mun. & County Eng., vol. 66, no. 6, June 1924, pp. 286-292, 7 figs. Bridge, chiefly of concrete-arch construction, serves 70,000 residents of city, crosses Lehigh River, Monocacy Creek, several streets and railway tracks design; pile foundations; coffer dams; forms and false work; mixer plants, etc.

Design of LaBalme Concrete Arch Bridge, J. Polivka. Cornell Civ. Engr., vol. 32, nos. 2, 3, 4, 5, and 6, Nov. and Dec. 1923, and Jan., Feb. and Mar. 1924, pp. 17-19 and VIII, 33-36 and VII, 50-52 and 56, 56-68 and IX, and 82-84, 11 figs. Describes highway bridge which crosses Rhone at Yenne; computation of roadway stresses and stresses in arch rib; results of experiments with glass model.

Hill to Hill Bridge, Bethlehem, Pa. Ry. Rev., vol. 75, no. 3, July 19, 1924, pp. 77-84, 13 figs. Long viaduct replaces wooden bridge over Lehigh River and eliminates 8 grade crossings. Bridge is of high level or viaduct type; except for 2 through truss spans and 8 through girder spans, entire structure is of reinforced concrete design.

Long Span Concrete Arch Design in France, C. S. Whitney. Eng. News-Rec., vol. 93, no. 12, Sept. 18, 1924, pp. 463-466, 1 fig. Special methods adopted by Freyssinet, noted French Engineer, to reduce shrinkage, rib shortening, and abutment deflection in concrete spans approaching 600 ft.

Reinforced Concrete Bridge of 432 Ft. Span, P. Calfas. Concrete & Constructional Eng., vol. 19, no. 5, May 1924, pp. 281-288, 5 figs. Describes new bridge which replaces old road bridge connecting St. Pierre-du-Vauvray with Andé across Seine, consisting of two arches imbedded in abutments and having a clear span of 432 ft. 6 in.; rise above level of spandrel is 82 ft.

Reinforced Concrete Bridge with Arches of 590 ft. 6 in. Span, P. Calfas. Concrete & Constructional Eng., vol. 19, no. 6, June 1924, pp. 352-357, 4 figs. Particulars of new bridge to be built across estuary of Elorn between Brest and Daoulas, consisting of 3 huge reinforced-concrete arched bays supported by 2 piers built in stream and 2 abutments on banks. Will have total length of about 2,625 ft.

Six-Span Concrete Arch Highway Bridge at Danville, H. H. Edwards. Eng. News-Rec., vol. 92, no. 21, May 22, 1924, pp. 896-898, 5 figs. Bridge is 1037-ft. reinforced-concrete structure, consisting of 6 arches and 7 short approach spans; details of foundation and arch centering.

The New Bridges of Freiburg (Switzerland) [Les nouveaux ponts de Fribourg (Suisse)], Ch. Dantin. Génie Civil, vol. 84, no. 14, Apr. 5, 1924, pp. 317-319, 14 figs. partly on supp. plate. Details of two concrete arch bridges, the Pérolle and the Zähringen bridges.

Two New Bridges over the Ihle Canal (Zwei neue Brücken über den Ihle-Kanal), W. Nakonz. Bautechnik, vol. 2, no. 6, Feb. 8, 1924, pp. 41-44, 15 figs. Both are highway bridges with concrete arches, one 46 m. and other 44.2 m. wide; construction details.

Unusual Spandrel-Braced Arch Bridge Built at Portland, O. Laurgaard. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 328-330, 5 figs. Design of Alexandra Ave. bridge in Portland, Ore. Dead loads reduced by use of high-strength concrete and short-span floorbeams. Trestle used as falsework in constructing arches.

Construction. Construction of Lorne Bridge, Brantford, Ont., F. P. Adams. Can Engr., vol. 47, no. 20, Nov. 11, 1924, pp. 493-497, 11 figs. Reinforced-concrete bridge built over Grand River to replace steel structure. Has a clear waterway of 400 ft. and three concrete arches one with 140-ft. and two with 130-ft, span; deck is 64 ft. wide overall.

Ferro-Concrete. Indian & East. Engr., vol. 54, no. 1, Jan. 1924, pp. 25-32, 20 figs. Its application to brige work and some notes on recent works.

Design. Development of Reinforced Concrete Bridge Design, A. E. Lindau. Ry. Rev., vol. 74, no. 13, Mar. 29, 1924, pp. 613-617. Historical review showing that invention of reinforced concrete permitted stone and concrete culverts to develop into bridges.

The Design of Steel and Concrete Bridges, A. C. Hughes. Surveyor & Mun. & County Engr., vol. 65, no. 1678, Mar. 14, 1924, pp. 277-279, 7 figs. Stress calculations.

Development. The Development of Reinforced Concrete Bridge, Mangold. Eng. Progress, vol. 5, no. 3, Mar. 1924, pp. 41-47, 10 figs. Reinforced-concrete slabs and girder bridges; arched bridges; erection of reinforced-concrete bridges.

East Prussia. Reinforced-Concrete Bridge Over the Alle River near Wehlau (Eine Eisenbeton brücke als Ersatz der kriegszerstörten Strassenbrücke über die Alle bei Wehlau), v. Zychlinski. Zentralblatt der Bauverwaltung, vol. 44, no. 42, Oct. 15, 1924, pp. 359-363, 11 figs. Details of design, reinforcement, falsework, and construction.

Elbe River, Hamburg. The Third Bridge Over Elbe at Hamburg (Die dritte Elbbrücke bei Hamburg (sogenannte Freihafen-Elbbrücke), M. Sperber. Bautechnik, vol. 2, no. 26, June 17, 1924, pp. 289-305, 48 figs. on supp. plates. Description and details of construction of new bridge within free port area for railroad, elevated, vehicular, and passenger traffic.

Erection Over Old Bridge. Building a Reinforcer Concrete Bridge Around an Old Steel Structure, A. E. Wynn. Concrete & Constructional Eng., vol. 19, no. 3, June 1924, pp. 360-368, 8 figs. Description of new bridge at Pulaski, N. Y., consisting of 2-ribbed open-spandrel arch over river and beam-and-girder trestle over part, and details of construction work.

Leam River, England. Prince's Bridge over the River Leam, Leamington, Spa. Surveyor & Mun. & County Engr., vol. 65, no. 1671, Jan. 25, 1924, pp. 87-88, 1 fig. Reinforced-concrete bridge consisting of a center span of 44 ft. and two side spans of 42 ft.

Load Tests. The Aa Bridge of the Wäggital Power Plant, Rempen, Switzerland, (Aa-Brücke Rempen des Kraftwerks Wäggital). Schweizerische Bauzeitung, vol. 83, no. 21, May 24, 1924, pp. 241-243, 3 figs. Reinforced concrete bridge, spanning valley over impounding reservoir, has three spans and length of 66 m.; results of load tests.

Long-Span. See Suspension.

Manitoba. Reinforced Concrete Bridges, Manitoba. Can. Engr., vol. 46, no. 16, Apr. 15, 1924, pp. 435-437, 11 figs. Various types of bridges built as a result of Manitoba Good Roads Act; provincial government pays one-half cost for steel or concrete bridges and municipalities other half. From Mun. Improvements.

Multiple-Arch, Distortion Measurements. Measured Changes in Shape of Multi-Arch Bridge, P. L. Brockway. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 304-306, 2 figs. Measurements were made on Maple St., bridge over Arkansas River, Wichita, and expected distortion from progressive filling not verified. No changes found after two years' service.

Pouring Method. How to Pour Concrete Bridges with Special Reference to Construction Joints, A. R. Carter. Mun. & County Eng., vol. 66, no. 5, May 1924, pp. 229-231. Relates policy adopted in Winnebago County, Ill., in pouring concrete structures.

Railway. See BRIDGES, RAILWAY, Concrete; DAMS, Concrete.

Standard Types, Spain. Official Spanish Types of Reinforced-Concrete Railway and Highway Bridges (Types officiels espagnols de ponts en béton armé pour routes et chemins vicinaux), J. E. Ribera. Génie Civil, vol. 84, no. 2, Jan. 12, 1924, pp. 39-41, 10 figs. Specifications adapted by Director of Pub. Works, with special reference to arch bridges.

Steel vs. Steel or Concrete Bridges? (Pontes de aço ou Pontes de concreto?), G. Ribeiro. Revista Brasileira de Engenharia, vol. 8, no. 5, Nov. 1924, pp. 205-208, 1 fig. Discusses materials and labor required for steel or reinforced-concrete bridges, and gives diagram for graphic calculation.

Suspension. Longest Concrete Bridge Span Includes Deck Suspended From Arch Ribs, H. J. Harms. Concrete, vol. 24, no. 4, Apr. 1924, pp. 138-140, 10 figs. See also Successful Methods, vol. 6, no. 2, Feb. 1924, pp. 10-11, 3 figs. Describes bridge at Saint-Pierre-du-Vauvray, France, over the Seine, in Eure Department; span 131.80 m., rise of arch 25 m.; consists of two fixed arches 8.90 m. center to center.

Toronto, Canada. Governor's Bridge in the Township of York, Ont., is Unique in Many Respects. Contract Rec. & Eng. Rev., vol. 37, no. 6, Feb. 6, 1924, pp. 121-127, 12 figs. See also Concrete, vol. 25, no. 2, Aug. 1924, pp. 55-58, 11 figs. and Can. Engr., vol. 46, no. 14, Apr. 1, 1924, pp. 389-392, 6 figs. Details of reinforced-concrete bridge 672 ft. overall length with main arch of 200 ft. span, across Belt Line Ravine, Toronto; by reason of flat arches, thin walled piers and abutments and electrically-welded reinforcing, it was built for only $100,000.

Viaducts. See VIADUCTS, Concrete-Arch.

BRIDGES, HIGHWAY

[See also BRIDGES, CONCRETE.]

Bear Mountain, N. Y. See Suspension.

Berlin, Germany. Rebuilding the Weidendamm Bridge in Berlin (Der Wiederaufbau der Weidendammer Brücker in Berlin), M. Cornehls. Bautechnik, vol. 2, nos. 33, 35, and 36, Aug. 1, 15, and 22, 1924, pp. 361-364, 377-379, and 388-390, 19 figs. Reconstruction due to tunneling for North South Ry. line; details of design and construction.

Concrete. Concrete Pile Trestle Highway Bridges in Texas, G. G. Wickline. Eng. & Contracting (Roads & Streets), vol. 61, no. 6, June 4, 1924, pp. 1224-1226. Design and construction features.

Descriptive Notes on the Construction of a Reinforced Concrete Highway Bridge, T. P. Francis. Surveyor & Mun. & County Engr., vol. 66, no. 1698, Aug. 1, 1924, pp. 99-101. Details of reconstruction of Town bridge, Pontypool.

Reading Bridge, Ferro-Concrete, vol. 15, no. 6, Dec. 1923, pp. 126-137, 6 figs. Main arch crosses river in single span of 180 ft.; total length, including approach viaduct, abutments and wing walls, is nearly 600 ft.

Reinforced Concrete Bridges for Large Spans (Eisenbetonbogenbrücken für grosse Spannweiten), H. Spangenberg. Bauingenieur, vol. 5, nos. 15 and 16, Aug. 15 and 31, 1924, pp. 461-468 and 503-512, 35 figs. Details of recent constructions and proposals, showing effect of reinforced-concrete construction on development of long spans. Proposes new method of construction enabling use of high grade ingot steel for long-span-reinforced-concrete-arches.

The Reinforced-Concrete Pasteur Bridge over the Rhone River at Lyons (Le pont Pasteur, en béton armé, sur le Rhône à Lyon). Génie Civil, vol. 84, no. 3, Jan. 19, 1924, pp. 53-57, 16 figs, partly on supp. plate. Construction details of bridge, 225 m. long, including 2 abutments, 13 m., and two arches, 62 m., 2 piers, 4 m. at base and center arch of 66 m.

BRIDGES, HIGHWAY

"Victoria Bridge" at Cremeno over the Pioverna on the Ballisio-Cremeno Road ("Ponte della Vittoria" a cremeno, sul Pioverna per la strada Ballisio-Cremeno). Industria, vol. 38, no. 13, July 15, 1924, pp. 358-365, 23 figs. Details of design and construction of reinforced concrete bridge, calculation of arch, erection work, etc.

See also BRIDGES, CONCRETE.

Construction. Highway Bridge Construction, P. Allan. Indus. Australian & Min. Standard, vol. 72, nos. 1862, 1863, 1864, 1865, 1866, and 1867, Aug. 14, 21, 28, Sept. 4, 11 and 18, pp. 243-246, 281-285, 318-322, 336-338, 394-396, and 432-435, 45 figs. Discusses practice in New South Wales; low and high level plain beam bridges. Aug. 21.

Timber truss bridges, Macdonald type and Allan type. Aug. 28: Timber truss bridges with overhead bracing. Sept. 3: Composite and steel truss bridges. Sept. 11 and 18: Movable bridges.

Design. Arrangement of Municipal Bridges at Limited Height and Medium Width (Ueber die Anordnung von städtischen Strassenbrücken bei gedrängter Bauhöhe und mittlerer Weite), Herbst. Bautechnik, vol. 2, nos. 45 and 47, Oct. 17 and 31, 1924, pp. 514-515 and 535-538, 28 figs. Bridging of rivers of 30 to 150 meters width; design and construction, esthetics, types of bridges, etc.

Bridges and Culverts for Highways, H. H. Shaw. Can. Engr., vol. 47, no. 10, Sept. 2, 1924, pp. 303-304. Practice followed in Prince Edward Island; concrete and corrugated iron culverts; steel bridges over estuaries. Abstract of paper read before Can. Good Roads Assn.

Outstanding Problems in Highway Bridge Design, E. F. Kelley. Eng. & Contracting (Roads & Streets), vol. 61, no. 2, Feb. 6, 1924, pp. 296-302, 3 figs. Also Can. Engr., vol. 46, no. 13, Mar. 25, 1924, pp. 374-376; Good Roads, vol. 66, no. 4, Apr. 1924, pp. 106-108. Discusses live loads, roadway widths, approaches, bridge floors, wearing surfaces, protection of structures and traffic.

Effects on Local Transit Conditions. The Secondary Effect of Certain Important River Bridges on Local Transit Conditions, J. A. Miller. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 4, Apr. 1924, pp. 389-400, 6 figs. Study of effect of construction of important vehicular bridges on transit conditions in adjacent communities; consideration of situation created by erection of new Delaware River bridge between Philadelphia and Camden; analysis of traffic movement across East River, N. Y., indicates that existing transportation lines in New Jersey should be extended across new bridge into Philadelphia.

Failure. Building Accident in Flensburg (Bauunfall in Flensburg). Bautechnik, vol. 2, no. 46, Oct. 24, 1924, pp. 524-526, 4 figs. Discusses collapse of three-hinge concrete arch after removing falsework, due to faulty withdrawing of falsework from ribs of arch.

Impact Studies. Impact Tests on Highway Bridges. Pub. Roads, vol. 5, no. 7, Sept. 1924, pp. 10-13, 3 figs. Progress report of coöperative research conducted at Ames, Ia.

Loading. Proposed Loading for Highway Bridges. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 291-295, 5 figs. Discussion of paper by H. D. Hussey.

Louisiana. Building a Bridge on Shifting Sands. N. E. Lant. Successful Methods, vol. 6, no. 4, Apr. 1924, pp. 8-10, 5 figs. Construction data of highway bridge recently completed over Thompson Creek, between Baton Rouge and St. Francisville, Louisiana; composed of twin spans, each 225 ft. long, and resting on reinforced-concrete abutments and center pier; designed to withstand unfavorable conditions in bed of stream.

Sapinero, Colorado. Erecting the Highest State Highway Bridge in Colorado. Eng. & Contracting (Roads & Streets), vol. 61, no. 6, June 4, 1924, pp. 1209-1211, 1 fig. Design, location and construction features of 130 ft. high, 230 ft. clear span Sapinero arch.

Steel. Completion of Humber Bridge Opens New Highway Entrance into City of Toronto. Contract Rec. & Eng. Rev., vol. 38, no. 38, Sept. 17, 1924, pp. 923-926 and 931-932, 11 figs. Steep, winding grades eliminated by erection of long bridge over Humber Valley; steel structure with concrete piers and abutments, comprising four arch and two truss spans.

Specifications for Steel Highway Bridge Superstructure. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 267-290, 6 figs. Final report of special committee on design and construction; deals with loads and stresses; details of design; workmanship; full-size eye-bar tests; weighing and shipping; structural steel for bridges; structural nickel steel.

Standard Specifications for Steel Highway Bridges. U. S. Dept. Agriculture—Bul., no. 1259, Oct. 9, 1924, 48 pp., 7 figs. Adopted by Am. Assn. State Highway Officials and approved by Secretary of Agriculture for use in federal-aid road work.

Tentative Specifications for Steel Highway Bridge Superstructure. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 329-342. Submitted as progress report of special committee on specifications for bridge and construction.

See also Toronto, Can.

Suspension. Spanning the Hudson River at Bear Mountain, V. H. Vandiver and A. S. Taylor. Compressed Air Mag., vol. 29, no. 2, Feb. 1924, pp. 769-773, 15 figs. See also Eng. Wld., vol. 24, no. 3, Mar. 1924, pp. 161-165, 11 figs. Particulars regarding suspension highway bridge to be constructed which will link east and west shores of Hudson river where it will prove great boon to automobilists; estimated to cost $3,500,000; will consist of six sections of structural steel, as follows: main span 1632 ft. between centers of main towers, east-shore span 210 ft. long, and west-shore span consisting of four sections 410 ft. long.

See also BRIDGES, SUSPENSION.

Switzerland. Bridge Building in St. Gall and Appenzell (St. Gallische und Appenzeller Brückenbauten). Schweizerische Bauzeitung, vol. 84, no. 20, Nov. 15, 1924, pp. 243-245, 7 figs. Details of bridges over Hundwilertobel and Rotbach, and of Sitter bridge of Swiss Federal Railways.

Sydney, Australia. Form Development of Sydney Bridge (Die Gestaltung der Sydney-Brücke), G. Müller. Bauingenieur, vol. 5, no. 18, Sept. 30, 1924, pp. 559-575, 48 figs. Compares principal types of large bridges; competitive designs for Sydney bridge; mathematical statics; engineering esthetics; etc.

Toronto, Can. Construction of Gerrard Street Bridge, J. S. Burgoyne and G. Alison. Can. Engr., vol. 46, no. 23, June 3, 1924, pp. 573-575, 6 figs. Further details describing construction of new highway bridge over River Don at Toronto. Erection of steel grillages for steel spans; falsework for arches; laying concrete deck and sidewalk slabs.

Humber River Highway Bridge, Toronto, A. B. Crealock. Can. Engr., vol. 47, no. 17, pp. 431-437, 13 figs. Describes new bridge on Bloor Street West provincial highway, having a total length of 745 ft. face to face of abutments and composed of 4 arch spans of 135 ft., two truss spans of 67 ft. 6 in. each, four piers with a width of 10 ft. at top and two abutments.

See also Steel.

Vienna. Construction and Upkeep of Municipal Bridges in Vienna (Zwei Jahre Bau und Erhaltung städtischer Brücken in Wien), F. Musil. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 41-42, Oct. 17, 1924, pp. 353-360, 12 figs. Details of bridge construction, especially over Danube river, and upkeep work.

BRIDGES, LIFT

Bascule. American Bridge Type Bascule Bridge, A. Reichmann. West. Soc. Engrs.—Jl., vol. 29, no. 4, Apr. 1924, pp. 177-181, 5 figs. Outline of the more characteristic types of bascules that have been developed in past 50 years. Describes heel trunnion of American Bridge Type bascule bridge.

Bascule Bridge and Viaduct at Coleraine. Ry. Engr., vol. 45, no. 535, Aug. 1924, pp. 265-271, 10 figs. Also Ry. Gaz., vol. 40, no. 12, Mar. 21, 1924, pp. 411-414, 7 figs. Engineering details and drawings of 11-span viaduct recently completed on L. M. & S. R. (Northern Counties Committee), Ireland. One section of structure includes first Strauss underhung counterweight bascule bridge in British Isles, erected over River Bann to replace old viaduct.

Completion of Johnson Street Bridge, F. H. Allwood. Can. Engr., vol. 46, no. 26, June 24, 1924, pp. 633-635, 5 figs. Describes construction of bascule bridge connecting Victoria and Esquimalt, B. C. Oxy-acetylene torch employed for demolishing old swing bridge; important features in erection of superstructure of highway and railway sections of bridge.

Floating Bridges (Über Schwimmbrücken), S. Kiehne. Bauingenieur, vol. 5, no. 11, June 15, 1924, pp. 355-356, 3 figs. on supp. plate. Describes bascule bridge with counterweight crossing harbor of Kiel, with facilities to allow ships of various sizes to pass.

Segmental Girder Construction As Applied to the Scherzer Rolling Lift Bridge, C. P. Hazelet. West. Soc. Engrs.—Jl., vol. 29, no. 4, Apr. 1924, pp. 187-194, 8 figs., partly on p. 208. Deals with segmental and track girder construction.

Strauss Bascule Bridge over the Bann River, Ireland, E. S. Needham. Engineering, vol. 118, no. 3075, Dec. 5, 1924, pp. 758-759, 24 figs., partly on supp. plate. Construction details of new movable span on main line of Lond. Midland & Scottish Ry.; length between abutments is 800 ft.; total length of bascule portion is 105 ft.

The Johnson Street Bridge, F. M. Preston. Eng. Jl., vol. 7, no. 12, Dec. 1924, pp. 717-721, 3 figs. Details of construction methods and comparative costs of Johnson Street Bridge in Victoria, B. C.; bascules are erected on solid concrete piers carried on piles driven to rock.

The New Brown Bascule Bridge, T. E. Brown, Jr. West. Soc. Engrs., vol. 29, no. 4, Apr. 1924, pp. 195-208, 14 figs. Describes new design of bascule invented by author for which certain claims of economy are made, and principles on which design is based.

The Rall Bascule Bridge, E. Haupt. West. Soc. Engrs.—Jl., vol. 29, no. 4, Apr. 1924, pp. 182-186, 4 figs. Describes Rall type of bascule bridge, and adaptation of its general features to a vertical lift bridge design.

Vertical. The Vertical Life Bridge, J. A. L. Waddell. West. Soc. Engrs.—Jl., vol. 29, no. 5, May 1924, pp. 209-216, 7 figs. Describes progress of vertical lift bridge designs with which author has been intimately associated for many years. References are given to other publications in which will be found more detailed information including statistics of bridges erected and detailed analysis of economics of movable spans.

See also Bascule.

BRIDGES, MASONRY

Abutments. See ABUTMENTS, Masonry Arched Bridges.

BRIDGES, MOVABLE

Bascule. See BRIDGES, LIFT, Bascule.

Swing. Construction of a Swing Bridge at the President Wilson Basin at Marseilles (Construction d'un pont tournant au bassin "Président Wilson" à Marseille), H. Descans. Assn. des Ingénieurs sortis des Ecoles spéciales de Gand—Annales, vol. 13, no. 4, 1923, pp. 267-350, 24 figs. on supp. plates. Bridge is 103 m. long and 14 m. wide, and weighs 2000 tons; local conditions and principal dimensions; estimate and plan of project; details of design and swinging mechanism.

BRIDGES, PONTOON

Cable-Operated. Cable-Operated Pontoon Bridge Over Chicago River. Eng. News-Rec., vol. 93, no. 22, Nov. 27, 1924, pp. 864-865, 3 figs. Temporary draw span completes important new thoroughfare; safety barrier protects highway traffic.

BRIDGES, RAILWAY

Cantilever Arch. New Niagara Gorge Arch Nearing Completion. Ry. Age, vol. 77, no. 19, Nov. 8, 1924, pp. 830-836, 10 figs. Bridge has span of 640 ft. from center to center of hinge pins and rise of 105 ft.; planned to carry two railway trucks on deck at 13-ft centers, and designed for cantilever method with pin bearing between two halves of lower chord at crown; noteworthy features of erection; closing operations.

Concrete. Long Girder Spans for Reinforced Concrete Bridge. Ry. Rev., vol. 75, no. 6, Aug. 9, 1924, pp. 202-205, 6 figs. Pennsylvania Ry. uses spans of unusual length for new structure which replaces steel bridge at Becks Run, Pa., Monongahela River.

Design. See BRIDGE DESIGN, Rhine River.

Erecting. See BRIDGE ERECTION, Cantilevering; Erection by Longitudinal Rolling.

Germany. Renovation and Protective Work of Railway Bridge at Rummelsburg, 30 Meters High (Instandsetzungs- und Schutzarbeiten an dem 30m. hohen Eisenbahnviadukt bei Rummelsburg i. Pom.), A. Wolfsholz. Deutsche Bauzeitung, vol. 58, no. 74, Sept. 13, 1924, pp. 145-147 (Konstruktion u. Bauausführung), 5 figs. Details of work at bridge 105 meters long over Stiednitz river, consisting of four middle piers of granite and five main spans of 16 meters.

Impact Allowances. See Vibrations.

Reconstruction, Virginia. B. & O. Replaces Bridges of Historic Interest, G. Lang, Jr. Ry Age, vol. 77, no. 4, July 26, 1924, pp. 145-148, 6 figs. Description of three bridges reconstructed by Baltimore and Ohio on Valley Railroad of Virginia, bridges being located in Shenandoah Valley between Harrisonburg and Lexington, and known as Bridges 117, 120, and 129. Construction details.

Steel. Admissible Load of Steel Bridges (Zur Frage der zulässigen Beanspruchung der eisernen Brücken), J. Melan. Zeit. des Osterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 27/28, July 11, 1924, pp. 243-248, 4 figs. Discusses development of methods for calculation, formulas used for impact, and their verification by locomotive tests, calculations for various lengths of spans, etc.

Remarkably Heavy Plate Girders in Skew Railroad Bridge. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 710-711; 3 figs. Buffalo road crossing required girders weighing 130 tons each; heavy flange sections and web reinforcement.

Replacement of Steel Railroad Bridges (Auswechslung eiserner Bahnbrücken), M. Schaechterle. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 3, Mar. 15, 1924, pp. 47-51, 3 figs. Introduction of heavier locomotives has necessitated reinforcement or replacement of numerous structural-steel bridges in Germany. Photos and line drawings of broken beams are given. New method to replace bridges is described.

The Design of a 50-Ft. Deck Span Plate Girder Railway Bridge, H. F. Cornick. Ry. Engr., vol. 45, nos. 533 and 534, June and July 1924, pp. 193-195 and 252-255, 10 figs. Details of design of typical girder bridge, using modern methods of calculation. Summary of bending moments; proportions of main girders; calculation of shear stresses; girder bracing.

Sweden. The New Lindingö Bridge in Stockholm (Die neue Lindingö-Brücke in Stockholm), H. Kulka. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 621-630, 18 figs. Design and construction of bridge connecting island of Lindingö with Stockholm; calculated traffic load 6.45 tons per linear meter; double track; one span of 140 meters, floated into position.

Testing. Dynamic Examination of Bridges (Dynamische Untersuchungen von Brücken), J. Geiger. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 606-611, 13 figs. Discusses vibrations due to mass effect of locomotive driving, its mass pressure moment, deviation of wheels from circular shape, deviation of track from straight line, measuring apparatus for vibrations, methods and results of measurement.

Traffic Load, Influence of. Investigation of the Dynamic Influence of the Traffic Load on Railway Bridges (Undersökning av trafiklastens dynamiska inverkan a järnvägsbroar), E. Nilsson. Teknisk Tidskrift, vol. 54, no. 17, Apr. 26, 1924, pp. 39-47 (Väg- och Vattenbyggnadskonst), 14 figs. Historical review of subject. Description of "extensometer" of Okhuizens in The Hague. Occurring stresses are measured by elastic deformations under load. Dynamic influences are shown to increase material stresses more than had been assumed.

Vibrations. The Vibration of Bridges. Ry. Engr., vol. 44, no. 527, Dec. 1923, pp. 462-465. Report by C. W. L. Jones to Indian Ry. Bridge Committee, embodying opinions and experiences of American engineers on impact allowances in railway bridge design.

BRIDGES, STEEL

[See also BRIDGES, RAILWAY.]

Arch. Eads Bridge Completes Fifty Years' Service, Chas. E. Smith. Ry. Age, vol. 77, no. 18, Nov. 1, 1924, pp. 783-786, 3 figs. See also Ry. Rev., vol. 75, no. 18, Nov. 1, 1924, pp. 647-654, 8 figs. Description of structure over Mississippi River at St. Louis shows few changes made since opening; early problems recounted.

Construction. Bridge Construction at Isle Maligne, J. P. Chapleau and C. M. Goodrich. Contract Rec. & Eng. Rev., vol. 38, no. 37, Sept. 10, 1924, pp. 892-895, 5 figs. Great power project of Quebec Development Co. on upper Saguenay involved construction of three steel bridges; cold weather concreting was feature of interest.

Erection. See BRIDGE ERECTION.

Girder. Replacing Railway Truss Span with Two Girder Spans. Eng. News-Rec., vol. 93, no. 22, Nov. 27, 1924, pp. 870-871, 4 figs. New masonry built clear of old span; falsework supported old deck while new girder spans were erected in renewal of Bluff Creek bridge on Chicago, Rock Island & Pac. Ry. near Caldwell, Kan.

Highway. See BRIDGES, HIGHWAY, Steel.

Painting of. Bases for Contracts for Protective Painting of Steel (Grundlagen für die Vergebung von Eisenschutzanstrichen), L. Herzka. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 612-614. Discusses placing of contracts by surface as superior to placing by weight; local knowledge as basis of prices; separation of shop work from painting is necessary.

Railway. See BRIDGES, RAILWAY, Steel.

Specifications. See BRIDGES, HIGHWAY, Steel.

Stresses. Secondary Stresses in Steel Riveted Bridges, O. H. Ammann. Eng. News-Rec., vol. 93, no. 17, Oct. 23, 1924, pp. 666-668, 5 figs. Notes on comprehensive series of tests and analytical studies carried out by Assn. Swiss Steel Fabricators.

Wind Bracings. Multiple Flange Frames for Wind Bracings of Long Span Steel Bridges (Mehrgurtige Fachwerke als Windverband weitgespannter eisener Brücken), J. Fritsche. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 618-621, 5 figs. Discusses calculation of bracings for full loads, and their application in long spans, giving examples.

BRIDGES, SUSPENSION

Bear Mountain, Hudson River. Bear Mountain Suspension Bridge Over Hudson River, H. C. Baird. Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924, pp. 914-918, 13 figs. Design of longest suspension span yet built.

Construction Progress on Bear Mountain Bridge. Eng. News-Rec., vol. 93, no. 17, Oct. 23, 1924, pp. 672-673, 3 figs. Describes physical features of work on suspension bridge in course of construction across Hudson River at Anthony's Nose.

Budapest, Reconstruction of. Rebuilding the First Budapest Suspension Bridge, J. Beke. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1096-1099, 3 figs. Reconstruction of oldest fixed bridge across Danube at Budapest, the Szechenyi suspension bridge, built in period of 1839-1849. Except for towers and anchorages, a completely new structure was built, to outlines of old bridge. Heavier eyebar chains, movable saddles, and accessible anchor bars.

Cables. See CABLES, Suspension Bridges.

Concrete. See BRIDGES, CONCRETE, Suspension.

Concrete Anchorage-Foundations Construction. Constructing Reinforced Concrete Foundations of Delaware River Bridge Anchorages, C. Carswell. Concrete, vol. 24, no. 3, Mar. 1924, pp. 103-110, 16 figs. Details of construction of foundations for anchorages of a two-cable stiffened suspension bridge connecting Philadelphia, Pa., and Camden, N. J. Constructed by means of reinforced-concrete caissons sunk by open dredging to rock 60 to 100 ft. below.

Florianopolis, Brazil. Design of the Florianopolis Suspension Bridge, D. B. Steinman. Eng. News-Rec., vol. 93, no. 20, Nov. 13, 1924, pp. 778-782, 3 figs. Main span of bridge under construction in Santa Catharina province, Brazil, is 1113 ft; longest eyebar suspension span in world; new stiffening truss produces more rigid bridge with less material; main chains made of heat-treated eyebars with yield point above 75,000 lb. per sq. in.; towers designed to rock on base.

Hudson River. Mid-Hudson Bridge to Be 1500-Ft. Suspension Span. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, p. 452, 3 figs. General features outlined by Modjeski & Moran, engineers for recommended bridge at Poughkeepsie; unusual tower design; piers to go 125 ft. to rock.

Menai Straits. An Account of an Examination of the Menai Suspension Bridge, H. T. Tudsbery

and A. R. Gibbs. Engineering, vol. 117, no. 3027, Jan. 4, 1924, pp. 23-24. Examination of bridge built in 1820-26, which is still only road connection between Anglesey and mainland. (Abstract.) Paper read before Instn. Civ. Engrs.

Self-Anchored Chain. Three New Allegheny River Bridges to be of Unusual Type. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 995-997, 3 figs. Self-anchored chain suspension type selected for down-town bridges in Pittsburgh which require rebuilding; only other example of type is bridge over Rhine River at Cologne, Germany.

Tower Erection. Towers of First Suspension Bridge Over Hudson River Completed. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 568-569, 2 figs. Erection of 350-ft. steel towers for highway bridge; approaches and anchorage tunnels under way.

BRIQUETS

Pressure Resistance Determination. Device for Determining Resistance to Pressure of Briquets (Ein Hilfsmittel zur Druckfestigkeitsbestimmung von Briketts), C. Hütter. Braunkohle, vol. 23, no. 23, Sept. 6, 1924, pp. 449-450, 1 fig. One of the briquets is crushed between two equal and parallel surfaces of known section by means of two hydraulic jacks, one of which has a manometer for reading off water pressure, used for calculation.

BRIQUETTING

Coal. See COAL, Briquetting.

Lignite. See LIGNITE, Briquetting.

BRONZES

[See also COPPER ALLOYS, Copper-Tin; NON-FERROUS METALS.]

British Practice. See ALLOYS, British Practice.

Characteristics. Mechanical Bronzes, E. G. Jarvis. Brass Wld., vol. 20, no. 3, Mar. 1924, pp. 81-83. Discussion of characteristics of various bronzes.

Cold Drawing and Annealing, Effect of. Note on the Effect of Cold-Drawing and Annealing on Some Electrochemical Properties of a Low-Tin Bronze, S. H. J. Wilson. Inst. Metals—Advance paper no. 14, for meeting Mar. 12-13, 1924, 11 pp., 5 figs. Investigation which is result of discovery by Alkins of a critical range in curve relating the amount of cold work received by copper or bronze wire to several physical properties.

Coloring. See COPPER, Coloring.

Copper-Tin-Graphite. See BEARING METALS, Durex.

Gun Metal. See GUN METAL.

High-Tin. Some Experiments on the Effect of Casting Temperature and Heat-Treatment on the Physical Properties of a High-Tin Bronze, F. W. Rowe. Inst. Metals—Advance paper no. 11, for meeting Sept. 8-11, 1924, 7 pp., 12 figs. partly on supp. plates. Describes experiments carried out to gain some idea of mechanical properties of a high-tin bronze under various methods of handling. Alloy used had following nominal percentage composition: copper, 84.00; tin, 15.95; phosphorus, 0.05.

Japanese. Japanese Bronzes (Japanische Bronzen. Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 33, Aug. 17, 1924, pp. 105-106 (Metall). Discusses their characteristics, furnaces used, coloring of alloys, analyses of some old and new bronzes.

Manganese. See MANGANESE BRONZE.

Manganese and Phosphorus in. See CAST IRON, Manganese and Phosphorus in.

Powders, Manufacture. See ALUMINUM, Powders, Manufacture.

Sand-Cast Zinc Bronze. The Effect of Casting Temperature on the Physical Properties of a Sand-Cast Zinc-Bronze, F. W. Rowe. Inst. Metals—Advance paper no. 12, for meeting Mar. 12-13, 1924, 6 pp., 18 figs. Investigation to determine, for works use, optimum casting temperature to give required mechanical properties in gun metal of composition specified.

Welding. See ELECTRIC WELDING, ARC, Copper.

BROWN COAL. See LIGNITE.

BRUSHES

Carbon. Commercial Methods of Carbon Resistance Measurement, R. Wilmeth. Elec. Jl., vol. 21, no. 7, July 1924, pp. 309-315, 9 figs. Discusses several methods from point of view of inspection, not technical laboratory; speed with which measurements can be made, reliability and accuracy.

Position against Commutator. Brush Angle and Direction of Commutator Relation, W. C. Kalb. Power, vol. 60, no. 25, Dec. 16, 1924, pp. 973-975, 5 figs. Answers question whether commutator should rotate against or away from sharp angle of brush face, and shows that specific direction of rotation is preferable for almost every individual case.

BUDGETING. See INDUSTRIAL MANAGEMENT, Budgeting Control; Budgeting.

BUILDING CONSTRUCTION

British Empire Exhibition. The Construction of the British Empire Exhibition, E. O. Williams. Concrete & Constructional Eng., vol. 19, no. 7, July 1924, pp. 420-432, 5 figs. Details of concrete construction work, proportion of mixes, tests on concrete cubes; detailed specifications for mass concrete, reinforced concrete, pre-cast construction. Abstract of paper read before Instn. Mun. & County Engrs.

Chemical Plants. Structural Teachings of the Oppau Explosion, E. G. Friedrich. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 66-67, 3 figs. Teachings concerning behavior of structural elements and structures derived from study of wreckage of ammonia plant in Oppau, Germany, after great explosion of Sept. 21, 1921.

Compressed Air in. See COMPRESSED AIR, Construction Work.

Concrete, Cold-Weather. Costs and Precautions in Winter Construction of Concrete Buildings, R. E. Egelhoff. Concrete, vol. 25, no. 6, Dec. 1924, pp. 211-215, 10 figs. Cost data, precautions to be taken, including use of canvas covers, and suggested specification for winter protection.

Conveyors. See CONVEYORS, Building-Construction.

Cost Estimating. Short Cut Methods of Estimating, C. E. Dingham. Contract Rec. & Eng. Rev., vol. 38, no. 14, Apr. 2, 1924, pp. 332-335. How to make preliminary estimates of building costs with a reasonable degree of accuracy.

Craftsmanship, Revival of. How Can the Spirit of Craftsmanship be Revived in the Building Industry, E. J. Mehren. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 837-838. Considers benefits that would result from revival of craftsmanship spirit; present conditions and their causes; effect of specialization; remedies; plans to reach workers and public.

Day-Labor. See CONSTRUCTION WORK, Day-Labor Construction.

Earthquake Protection. Lessons in Building Taught by the Japanese Earthquake Disaster.

Eng. World, vol. 24, no. 1, Jan. 1924, pp. 22-25. Abstract from report of extensive investigation of structures of various types under supervision of R. F. Moss, Trucson Steel Co. of Japan.

Estimating. The Principles and Practice of Estimating, T. S. Smith. Surveyor & Mun. & County Engr., vol. 65, no. 1672, Feb. 1, 1924, pp. 153-156, 1 fig. See also Concrete & Constructional Eng., vol. 19, no. 2, Feb. 1924, pp. 103-109, 1 fig. Views on estimating for concrete and excavation; methods of estimating, analysis of consistuents of concrete, determination of voids of a unit volume of aggregate, and pricing.

See also Steel Estimating.

Fire Protection in. See FIRE PROTECTION, Building Design.

Fireproof. Analysis of Cost of Types of Fireproof Construction, A. F. Klein. West. Soc. of Engrs.—Jl., vol. 29, no. 7, July 1924, pp. 290-300, 10 figs. Gives unit costs of different methods of fireproof construction of 3 types of buildings; analyzes 4 types of construction for 16-story hotel, 3 for light manufacturing building and 3 for heavy warehouse.

Comparison of Types of Fireproof Construction, C. L. Post. West. Soc. of Engrs.—Jl., vol. 29, no. 7, July 1924, pp. 278-289, 11 figs. Compares types of fireproof construction covering foundations, columns and floor construction, hollow clay tile arches, reinforced-concrete joist construction, flat-slab construction, etc., recognizing fact that no universal rules can be laid down.

Floor Areas, Limitation of. Building Code Limitations on Floor Areas in Buildings, R. G. Kimball. Am. Architect & Architectural Rev., vol. 125, no. 2442, Mar. 26, 1924, pp. 301-308, 9 figs. Discussion of present practices and presentation of a new and logical method of limiting areas of floors in buildings.

Foundries. See FOUNDRIES, Building Design.

Framework Calculations. Calculation of Symmetric Framework by Means of the Four-Moment Theorem (Die Berechnung symmetrischer Stabwerke mit Hilfe des Viermomentensatzes), P. Abeles. Beton u. Eisen, vol. 23, nos. 9 and 10, May 5 and 20, 1924, pp. 110-114 and 123-125, 30 figs. Discusses four-moment theorem by Bleich; angle of rotation of right-angled frames with symmetric and asymmetric loading; lattice girders; etc.; develops formulas and makes calculations; numerical examples.

German Regulations. New Technical Regulations for Building Construction (Neuordnung der technischen Vorschriften für Bauleitungen). Beton u. Eisen, vol. 28, no. 21, Nov. 5, 1924, pp. 285-286. Details of regulations for specifications issued by German Committee of Adjudications regarding concrete construction work.

Java. European Architecture in Java (Die europäische Baukunst auf Java). Zentralblatt der Bauverwaltung, vol. 44, no. 41, Oct. 8, 1924, pp. 347-349, 14 figs. Details and examples of Javanese buildings and architecture. From Ingenieur, no. 22, 1924.

London Building Law. The Proposed Reform of the London Building Law, C. A. Daubney. Roy. Inst. British Architects—Jl., vol. 31, no. 16, June 28, 1924, pp. 525-533, 10 figs. Gives proposed modifications of law.

Machine Shops. See MACHINE SHOPS, Construction.

Machinery For. Machinery for Building Construction (Baumaschinen). Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 27 and 28, July 5 and 12, 1924, pp. 689-720 and 735-739, 74 figs. Series of articles describing types of dredges and excavators, automatic unloaders, cranes, locomobiles; compressed air and electricity as power; foundations, etc.

Metal Lath for Fire Protection. Metal Lath as a Protection from Fire, Wharton Clay. Eng. & Contracting (Water Works), vol. 61, no. 1, Jan. 23, 1924, pp. 185-187. Value of metal lath as protection for lumber; vast increase in safety of frame buildings at about 2 per cent increased cost. From address before First Nat. Fire Prevention Congress, Oct. 8-13, 1923.

Metal-Lath Reinforcement. Metal Lath in the Construction of Industrial Buildings, E. M. Lurie. Safety Eng., vol. 47, no. 3, Mar. 1924, pp. 124-133, 12 figs. Fire resistive qualities of metal lath in reinforcing cement columns, girders, steel and wooden beams, floor joists, roof trusses, partitions, elevator and stair enclosures.

Office Buildings. How a Contractor Schedules Operations for a Large Office Building, W. J. Lynch. West. Soc. Engrs.—Jl., vol. 29, no. 6, June 1924, pp. 265-272. Description of sequence of operations in construction of typical large office building, of steel construction and assuming provisions on lower floors for special uses, such as banking floor or large auditorium.

Pisé. Houses of Mud, J. W. Porter. Sci. Am., vol. 130, no. 4, Apr. 1924, p. 233, 4 figs. Describes method of pisé construction, in which earth is converted into walls by means of molds made of shuttering, into which earth is rammed by means of a pisoir or rammer; advantages and economy of method.

Pressed Steel in. Pressed Steel Construction for Fire Safety, A. I. Curtis. Eng. World, vol. 24, no. 1, Jan. 1924, pp. 10-12, 8 figs. Discusses reasons and claims for fireproof value of metal-lumber construction.

Reinforced Brickwork. Reinforced Brickwork, T. W. D. Miller. Roy. Engrs. Jl., vol. 38, no. 1, Mar. 1924, pp. 108-115, 11 figs. partly on supp. plates. Describes construction of Officers' Hostel at Chaklala, near Rawalpindi (British India), employing reinforced brickwork instead of reinforced concrete, also method of calculation, testing, and cost data.

Reinforced-Concrete. A Note on Concrete Buildings, M. Ayrton. Roy. Inst. Brit. Architects—Jl., vol. 31, no. 10, Mar. 22, 1924, pp. 298-302, 6 figs. Discusses problems of reinforced-concrete building construction.

Fast Work Is Feature of Buffalo Winter Construction. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 368-371, 7 figs. Large 8-story reinforced-concrete and brick building closed in less than 3 months in midwinter. Notes on methods employed. Old structure used as part of housing; unusual formwork.

Fireproof Quality of Reinforced Concrete Buildings (Ueber die Feuerbeständigkeit von Eisenbetonbauten), M. Silomon. Beton u. Eisen, vol. 23, no. 9, May 5, 1924, pp. 114-117. Traces damage done by fire back to its physical causes with view to increase further fireproof quality of reinforced concrete.

The Earthquake Disaster in Japan From the Standpoint of the Civil Engineer (Das Erdbebenunglück in Japan vom Standpunkt des Bauingenieurs), M. Briske. Bauingenieur, vol. 5, no. 11, June 15, 1924, pp. 327-334, 28 figs. Illustrates and describes damaged buildings and other structures, including reinforced-concrete structures; destruction due mainly to static behavior toward oscillations produced by earthquake.

Reinforced-Concrete, Winter-Weather Protection. Winter Weather Protection for Buildings, R. E. Egelhoff. Eng. & Constructing (Buildings), vol. 62, no. 6, Dec. 24, 1924, pp. 1356-1362, 11 figs. Methods of and equipment developed by Turner Construction Co., a concern with 15 years' experience.

Safety in. Safety in Building Construction, W. E. Welch. Safety Eng., vol. 46, no. 6, Dec. 1923, and vol. 47, nos. 1 and 2, Jan. and Feb. 1924, pp. 284-287, 26-31 and 70-74, 7 figs. Dec.: Sub and super structure steel erection and other erection about four stories above street level. Jan.: Caisson excavation under air pressure for building fundations. Feb.: Outside and inside protection; scaffolding, etc.

Statics. Recent Works on Statics of Building Construction in 1923 (Die Neuerscheinungen in der Statik der Baukonstruktionen im Jahre 1923), G. Worch. Beton u. Eisen, vol. 23, nos. 12 and 14, June 20 and July 20, 1924, pp. 161-164, and 184-188, 32 figs. Critical review of more recent literature on subject and gives examples as illustrations.

Steel. Standardizing Iron Construction and Reducing it to Types (Normung und Typung im Eisenbau), H. Schmuckler. Bauingenieur, vol. 5, no. 22, Nov. 25, 1924, pp. 744-748, 11 figs. Deals with standardization committees and their work, including building codes. Advantages of "types" of iron construction or structural steel buildings such as halls or sheds for workshops, exhibitions, etc.

Steel, Code for. See STRUCTURAL STEEL, Construction Code.

Steel Estimating. Estimating the Structural Steel of Buildings, R. Fleming. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 387-390. Hints from experience with problems and difficulties of estimating; approximate and close estimates; influence of specifications; common errors and recommended cautions.

Steel-Framework Collapse. Unbraced Steel Frame Collapses in Spokane. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1066-1067, 2 figs. Report of C. A. Burnette and B. J. Garnett, official investigating commission, on causes of collapse of nearly-completed steel framework of four-story Masonic Temple Annex in Spokane, Wash., on May 9, 1924. Found to be chargeable to absence of proper bracing of steel frame.

Thermotite Method. Thermotite Construction Method Offers Interesting Variation in Concrete Building Units. Cement & Eng. News, vol. 36, no. 6, June 1924, p. 27, 2 figs. Units used are solid slabs with faces 15 in. long by 8 in. high, with thicknesses varying from 2½ in. to 4 in., to meet load requirements under various conditions, made tongue-and-grooved on all edges and produced by "semi-dry" tamping process.

Tribune Tower, Chicago, Ill. The Tribune Tower, H. J. Burt. West. Soc. Engrs.—Jl., vol. 29, no. 12, Dec. 1924, pp. 451-464, 10 figs. General description of structural work in connection with new Chicago building. See also Mechanical Equipment of the Tribune Tower, J. A. Sutherland, same journal, pp. 465-467.

Tubular-Steel System. Steel Construction with the Use of Tubular Members. Engineering, vol. 118, no. 3072, Nov. 14, 1924, pp. 674-675, 16 figs. Examples of structures built in Holland making use of tubular members; advantages claimed for method.

Weather Conditions Affecting. Weather and Construction. Eng. & Contracting (Buildings), vol. 62, no. 5, Nov. 26, 1924, pp. 1175-1187, 2 figs. Results of study to determine average and extreme weather conditions affecting building construction in nine large cities. Gives tables of climatic conditions in these nine representative construction centers, with explanation of their use in planning all-year construction, prepared by Division of Building and Housing, Dept. Commerce, Wash., D. C.

Winter Construction. Winter Construction, C. S. Hill. Eng. News-Rev., vol. 93, nos. 14, 15, 16, and 17, Oct. 2, 9, 16, and 23, 1924, pp. 532-535, 588-590, 632-635, and 674-675, 12 figs. Responsibilities and difficulties of contractor. Oct. 2: Labor and climate. Oct. 9: Processes and plant. Oct. 16: Methods and costs. Oct. 23: Coördinate services.

See also Concrete, Cold-Weather.

Wooden. Examples of Modern Wooden Construction (Exemples de charpentes modernes en bois), F. Cretin. Génie Civil, vol. 84, no. 11, Mar. 15, 1924, pp. 256-260, 22 figs. Gives examples showing possibilities of permanent or semi-permanent constructions, following usual types, such as straight or parabolic beams, solid webb arches, trussed beams and arches, and triangular systems of large bays.

BUILDING MATERIALS

Basic, Works for Making. Blue Diamond Materials. Rock Products, vol. 27, no. 1, Jan. 12, 1924, pp. 40-52, 43 figs. Describes works of Blue Diamond Materials Co., Los Angeles, Cal., manufacturers, producers, and distributors of basic building materials; equipment of the different buildings; Hay mixed mortar process.

Heat Conductivity of. See MATERIALS, Heat Conductivity of.

Heat Transmission in. See HEAT TRANSMISSION, Building Materials.

Hollow Tile. Strength, Absorption and Freezing Resistance of Hollow Building Tile, H. D. Foster. Am. Ceramic Soc.—Jl., vol. 7, no. 3, Mar. 1924, pp. 189-199, 7 figs. Describes test methods and gives summary of compressive strength and absorption determinations of nearly 350 tests of tile selected from 25 representative sources. Preliminary report of resistance to freezing and thawing of tile from 17 representative sources. (Pub. by permission U. S. Bur. Standards.)

Limestone. See LIMESTONE.

Magnolite. "Magnolite," a New Building Material (Un nuovo materiale da costruzione, la "Magnolite"). Industria, vol. 38, no. 7, Apr. 15, 1924, pp. 195-197, 11 figs. Particulars of uses of blocks, plates and hollow tiles composed of wood shavings and a fireproof binder and formed under pressure.

Mortars. See MORTARS.

Plaster. See PLASTER.

Structolite. Structolite, a Gypsum Concrete. Rock Products, vol. 27, no. 25, Dec. 13, 1924, pp. 26-27, 2 figs. New plastic material especially adapted for walls of dwellings and one-story commercial structures.

Structural Steel. See STRUCTURAL STEEL.

Stucco. See STUCCO.

Testing. Relative Efficiency of Building Materials, L. E. Allen. Mich. Architect & Engr., vol. 6, no. 11, Nov. 1924, pp. 138-140, 2 figs. Describes absorption or porosity test, strength tests, and fire resisting tests developed to determine relative merits of building materials.

Testing Machine for. Torsional Oscillating Machine, a New Testing Machine for Determining Quality of Building Materials (Die Drehschwingungsmaschine, eine neue Prüfmaschine zur Gütebestimmung von Werkstoffen), O. Föppl. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 9, Mar. 1, 1924, pp. 203-205, 4 figs. Discusses newly found property of building materials, the damping capacity, which is observed with torsional oscillating stress; damping capacity can be determined in connection with shear intensity, and plotted in curves.

Wood Composition Blocks. See Magnolite.

BUILDINGS

[See also STRUCTURES.]

Acoustics. See ACOUSTICS.

Atmospheric Impurities, Effect on. The Effect of Atmospheric Impurities on Buildings, F. Baines. Gas Jl., vol. 168, no. 3211, Nov. 26, 1924, pp. 575-577. Effect involves disfigurement of building and decay of material.

British Empire Exhibition, Wembley. The British Empire Exhibition Buildings. Engineering, vol. 117, nos. 3034, 3035, and 3036, Feb. 22, 29, and Mar. 7, 1924, pp. 225-228, 263-266, and 291-293, 59 figs. partly on supp. plates. Construction features and layout of exhibition. Structural details of Palace of Engineering, which probably covers larger area than any other reinforced-concrete building in world. Mar. 7: Palace of Industry.

Ceilings. See CEILINGS.

Columns. See COLUMNS.

Concrete. Large Concrete Flat Buildings. Erected in Thirteen Weeks. Eng. News-Rec., vol. 92, no. 13, Mar. 27, 1924, pp. 531-532, 4 figs. Columns of Emperger type; all members of uniform size; plant and forms; concreting averaged two stories daily.

See also Hamburg, Germany; Hospital.

Concrete, Failure of. Further Data on Benton Harbor Concrete Building Failure. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 556-559, 3 figs. Tests clear concrete materials but show concrete itself very weak; inadequate cold weather precautions in mixing of concrete and in protection of floors after pouring.

Reinforced-Concrete Hotel Under Construction Fails by Progressive Collapse, T. L. Condron. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 239-242, 6 figs. 8-story Benton Harbor structure completely wrecked by slow failure continuing 30 hours after removal of fifth-floor shores; cause not determined but materials and cold weather suspected.

Construction. See BUILDING CONSTRUCTION.

Department Stores, France. The New Department Store Du Printemps, Paris (Les nouveaux magasins du Printemps, à Paris), J. Michaut. Génie Civil, vol. 85, nos. 4 and 5, July 26 and Aug. 2, 1924, pp. 81-89 and 108-113, 32 figs. Details of rebuilt stores, new design, reinforced concrete construction, Chicago Underwriters Specifications for protection against fire, alarm system, heating and ventilating, elevators and traffic arrangements, pneumatic carriers, etc.

Domes. See DOMES.

Earthquake-Proof. See EARTHQUAKES, Characteristics of.

Electric Heating of. See HEATING, ELECTRIC, Buildings.

Electrical Mechanical Equipment. Electrical Mechanical Equipment, F. G. Turnbull. Am. Architect, vol. 125, no. 2438, Jan. 30, 1924, pp. 123-126, 6 figs. Discusses equipment for water pumping, refrigeration, elevator service, and heating and cooking in buildings.

Esthetic. See INDUSTRIAL PLANTS, Construction.

Factories. See FACTORIES.

Floors. See FLOORS.

Foundations. See FOUNDATIONS.

Foundries. See FOUNDRIES.

Girders. See GIRDERS.

Hamburg, Germany. Ballin House in Hamburg (Das "Ballinhaus" in Hamburg), H. & O. Gerson. Zentralblatt der Bauverwaltung, vol. 44, no. 32, Aug. 6, 1924, pp. 267-269, 9 figs. Details of design and construction, reinforced-concrete construction on 1400 wood piles.

Heat Insulation of. See HEAT INSULATION, Buildings.

Heat Transmission in. See HEAT TRANSMISSION, Buildings; Walls.

Heating. See HEATING, Buildings.

Height of. See CITY PLANNING, Height of Buildings.

Hospital. Structure and Facilities of a Modern Hospital, A. Peabody. Eng. News-Rec., vol. 92, no. 15, Apr. 10, 1924, pp. 608-611, 7 figs. Wisconsin State Institution at Madison has concrete frame with slab and joist floors; wood, tile, and concrete flooring; natural ventilation with windows of transom type; pipe arrangements.

Hotels. See HOTELS.

Houses. See HOUSES.

Industrial, Planning Construction Program. Planning the Construction Program, A. G. Anderson. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 595-598, 6 figs. Value of specialized knowledge in industrial building.

Japan, Resistance to Earthquake. On the Various Influences of the Destructive Force of the Earthquake and the Resistance of Buildings, S. Uchida. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 426, Jan. 1924, pp. 19-32, 75 figs., partly on supp. plates. (In Japanese.)

Layout, Hosiery Mill. Special Design for Hosiery Mill on Pacific Coast, J. R. Poteat. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 707-708, 3 figs. Axis of line of buildings chosen to eliminate excess sunlight; bracing against vibration and to withstand earthquake tremors; layout and column spacing to fit machine sizes.

Machine Shops. See MACHINE SHOPS.

Materials for. See BUILDING MATERIALS.

Moving. Moving the Seven Story Dowie Building, H. Filippi. West. Soc. Engrs.—Jl., vol. 29, no. 1, Jan. 1924, pp. 13-22, 8 figs. Describes moving of large building in connection with terminal improvement in Chicago; notes on construction plant; underpinning; arrangement of tracks; general cribbing; cable and capstan arrangement; total distance through which building moved was 85 ft.

Railway Stations. See RAILWAY STATIONS.

Raising. Recent Examples of Raising Buildings (Neuzeitige Hebung von Bauwerken), A. Moritz. Bauingenieur, vol. 5, no. 15, Aug. 15, 1924, pp. 479-482, 8 figs. By means of example shows how to avoid troublesome and expensive procedure by using simple but improved hydraulic devices.

The Settlement and Righting of a Factory Building in Holland. Engineering, vol. 117, no. 3032, Feb. 8, 1924, pp. 174-176, 12 figs. Describes settling of oil-hardening building situated alongside of Maas River, and its righting, by lifting the whole in such manner as not to interfere with continuous operation of plant; how 3-story building with 82-ft. tower was raised.

Roofs. See ROOFS.

Schools. Fireproof School Building Contains Novel Features, F. A. Naramore. Concrete, vol. 25, no. 6, Dec. 1924, pp. 216-222, 8 figs. Description and construction details of new James A. Garfield High School, Seattle, Wash. Building is of skeleton type; floor slabs, beams, columns and walls are of reinforced-concrete, and exterior of face brick and terra-cotta trimming.

Skylights. See SKYLIGHTS.

Stairs. Economic Construction of Reinforced-Concrete Stairs (Die Wirtschaftlichkeit der Bauformen von Eisenbetontreppen), A. Habel. Beton

u. Eisen, vol. 23, nos. 13 and 15, July 5 and Aug. 5, 1924, pp. 173-176 and 197-200, 9 figs. Discusses types of stairs and their design and calculation.

Stairways. See STAIRWAYS.

Steel-Frame. Growth of Steel Frame Buildings, H. J. Burt. Eng. News-Rec., vol. 92, no. 16, Apr. 17, 1924, pp. 680-684, 7 figs. Origin and problems of skyscraper.

Steel Framework, Stresses in. Measured Stresses in Columns of 18-Story Building. Eng. News-Rec., vol. 94, no. 14, Oct. 2, 1924, pp. 540-542, 5 figs. Results of series of strain-gage measurements of dead-load stresses in steel framework of Equitable Life Insurance Co. of Iowa Building, Des Moines. Readings taken during erection show close check with computed loads and moderate bending effects. Abstract from Bul. 71, Eng. Experiment Station, Iowa State College.

Theaters. See THEATERS.

Ventilation. See VENTILATION.

Vibrations. See VIBRATIONS, Buildings.

Warehouses. See WAREHOUSES.

Wind Pressures, Effect of. Investigations of Wind Pressure and Suction Acting on Buildings (Undersögelser af vindens tryk og sugning paa bygningsvaerker), Fr. Jahnsen. Ingeniören, vol. 33, no. 19, May 10, 1924, pp. 229-232, 6 figs. Results of experiments made on small models.

The Effect of Wind Suction on Buildings (Windsaugwirkungen an Gebäuden), R. Sonntag. Deutsche Bauzeitung (Konstruktion & Bauausführung), vol. 58, nos. 17-18 and 21-22, Mar. 1 and 15, 1924, pp. 38-39 and 43-46, 5 figs. Review of investigations of wind suction on building models and discussion as to what extent results of model tests can be applied to actual buildings; examples of accidents due to suction effect of wind on roofs and hangars.

BULKHEADS

Concrete. See CONCRETE CONSTRUCTION, Bulkheads.

BUOYS

Gas and Bell. Modern Gas and Bell Buoy Built by Lighthouse Service. Eng. News-Rec., vol. 93, no. 20, Nov. 13, 1924, pp. 783-784, 3 figs. Bell operated by carbonic-acid gas; flashing acetylene gas light; buoy designed to minimize rolling.

BUSBARS

Calculation. Determining the Cross Section of Conductors in Switching Plants (Die Bestimmung des Leiterquerschnittes in Schaltanlagen), Waltjen. Siemens-Zeit., vol. 4, nos. 9 and 10, Sept. and Oct. 1924, pp. 302-307 and 336-340, 20 figs. Discusses calculation from standpoint of cheapness, economy, and voltage drop. Figures for round and flat copper. Examples.

Zinc. Damages to a Zinc Supply Busbar for Current Transformers (Ueber eine Zerstörung von Stromwandlerzuführungsschienen aus Zink), U. Retzoe. Werkstattstechnik, vol. 18, no. 9, May 1, 1924, 66. 257-260, 6 figs. Account of damages occurring in a special case and investigation of causes.

BUSES

Lighting. Lighting the Bus Interior, W. C. Brown. Bus Transportation, vol. 3, no. 9, Sept. 1924, pp. 399-401, 15 figs. Well-known types of fixtures are compared according to illumination, glare, maintenance, and other factors; requirements outlined for good wiring, sockets, and switches.

Motor. See MOTOR BUSES.

Operating Results. Bus Operating Results in Providence, R. I. Elec. Ry. Jl., vol. 64, no. 2, July 12, 1924, pp. 43-45, 3 figs. Figures of operating costs and revenue possibilities in various kinds of service on United Elec. Rys. of Providence, R. I., a company which operates buses in coöperation with railway service. Only one line of seven made profit although others substituted for rail lines show less than rail operation.

Trolley. Railless Trolley Cars at Ipswich. Tramway & Ry. World, vol. 55, no. 3, Jan. 17, 1924, pp. 9-13, 11 figs. Description of three single-deck trolley buses with seating capacity of 30 passengers each, loaned to Ipswich Corporation Tramways (Lond.) by Railless Ltd. for demonstration purposes, because of company's considering replacement of tramway system with railless system; experiment successful.

The Scope of the Trolley 'Bus, C. O. Silvers. Motor Transport (Lond.), vol. 39, no. 1010, July 7, 1924, pp. 13-14, 2 figs. Its advantages and disadvantages; traffic and mechanical requirements.

The Trolley-Bus Line between Modane and Lanslebourg (France) (La ligne d'electrobus de Modane à Lanslebourg), A. Chardin. Industrie des Tramways, vol. 18, no. 206, Feb. 1924, pp. 41-46, 4 figs. Brief description of installations, including two substations, trolley lines, passenger buses, and trucks; results of tests and economic advantages of system.

Trackless Trolleys Give Improved Service to Cohoes, N. Y. Elec. Ry. Jl., vol. 64, no. 24, Dec. 13, 1924, pp. 985-988, 9 figs. New route passes through main business section, replacing railway belt line; residents in large area now can reach central section in 4 minutes, as against 15 minutes previously.

Trolley Omnibuses at West Hartlepool. Tramway & Ry. Wld., vol. 55, no. 19, Apr. 17, 1924, pp. 176-179, 5 figs. Particulars of single-deck type bus with saloon body providing accommodation for 36 passengers; overall length, 28 ft. 6½ in.; overall width, 7 ft. 6 in.; equipped with a single electric-traction motor of 42 b.hp. at 525 volts on tramway rating at 1100 r.p.m.

BUSHINGS

Cast-Iron. Close Work on a Cast Iron Bushing, D. T. Hamilton. Am. Mach., vol. 60, no. 25, June 19, 1924, pp. 915-917, 5 figs. Accurate guide bushing for gear-shaper spindle; tolerance of 0.0002 in. in bore; unsuccessful methods; grinding operations.

Condenser-Type. Condenser Type Bushings, K. Humburg. Electrician, vol. 93, no. 2414, Aug. 22, 1924, pp. 198-199, 7 figs. Gives design and calculation. Abstract of article in Archiv für Elektrotechnik.

Electric. Calculation of Electric Bushings (Calcul des isolateurs de traversée), J. Labouret. Revue Générale de l'Electricité, vol. 15, no. 6, Feb. 9, 1924, pp. 222-225, 6 figs. Safety against puncture of bushings mounted in grounded parts, such as oil switches, transformers, or building walls, will depend upon configuration and density of electro-static field between live part and grounded portion. How equipotential lines of electric field may be calculated and how these theoretical results may be used to determine actual shape of insulation on a bushing.

C

CABLE TRAMWAYS

Military. Military Cable Tramways (Teleferiche di guerra), M. Michelini. Industria, vol. 38, nos. 2 and 3, Jan. 31 and Feb. 15, 1924, pp. 33-38 and 68-76, 72 figs., partly on pp. 80-81. Describes various Italian and Austrian types used in mountainous country during war.

CABLES

Electric. See CABLES, ELECTRIC.

Hoisting. See CABLES, HOISTING.

Manufacture. Torsion in the Manufacture of Metallic Cables (Les questions de torsion dans la fabrication des cables métalliques), J. Seigle. Revue de l'Industrie Minérale, no. 93, Nov. 1, 1924, pp. 514-522, 10 figs. Principles of cable stranding machines and review of construction and operation of various machines.

Suspension Bridges. Study of Cables with Special Regard to Cables for Suspension Bridges (Etude sur les cables et spécialement sur les câbles de ponts suspendus), G. Pigeaud. Génie Civil, vol. 84, nos. 15, 16, 17, and 18, Apr. 12, 19, 26, and May 3, 1924, pp. 345-350, 374-378, 399-402, and 421-423, 6 figs. Bridge cables connected to non-rigid roadway. Bridge cables connected to a rigid girder and their calculation; windbrace cables supporting only their own weight.

CABLES, ELECTRIC

Aerial. See Construction.

Aluminum, Heating of. See ELECTRIC CONDUCTORS, Heating of.

Aluminum-Steel-Cored. Aluminium Steel Cored Cables. Australasian Elec. Times, vol. 3, no. 1, Jan. 27, 1924, pp. 47-48. Tests carried out on samples of 7-strand cable containing 1 central galvanized steel and 6 aluminum wires each approximately 0.146 in. in diam.

General Tables for Calculating Load and Sag of All Compound Cables (Allgemeine Rechentafeln zur Bestimmung von Beanspruchung und Durchhang sämtlicher Verbundseile), K. Riedlinger. Elektrotechnik u. Maschinenbau, vol. 42, no. 27, July 6, 1924, pp. 421-427, 5 figs. Gives alignment charts and graphs for calculation, and shows application on practical example.

Steel-Aluminum Cables (Stahlaluminiumseile), A. Bürklin. Elektrotechnische Zeit., vol. 45, no. 43, Oct. 23, 1924, pp. 1143-1146. Results of tests to determine breaking loads and coefficients of elasticity; comparative tests to determine heat-expansion coefficients of steel-aluminum and copper cables; determination of sag and tensile stress.

Armored. Alignment Charts for Calculating Variation in Price of Armored Cables (Abaques pour le calcul des variations de prix des câbles armés), A. Castel. Électricien, vol. 40, no. 1352, July 15, 1924, pp. 313-319, 7 figs. Gives charts for copper and aluminum cables and explains their use.

See also Submarine.

Charge and Discharge. Cable Charge and Discharge, Chas. P. Steinmetz. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 525-530. It is shown that phenomenon of "soaking in of charges" or "electrification of cable" is true electric-circuit transient, has nothing to do with hysteresis effects, but is result of inductance and capacity, i.e., is in no essential different from usual rapid starting or stopping transient of ordinary circuit, except that it is many thousands of times slower; conclusions are derived, some of which may be pertinent with regard to mechanism of breakdown of insulation.

Coils for. See COILS, Petersen; Pleijel; Pupin.

Compounds for, Dielectric Losses of. Dielectric Losses of Cable Compounds (Dielektrische Verluste von Kabeltränkmassen), H. W. Birmbaum. Elektrotechnische Zeit., vol. 45, no. 12, Mar. 20, 1924, pp. 229-232, 9 figs. Results of large number of dielectric test measurements on various cable compounds made in laboratories of cable company; about 15 different materials, some of American origin, were investigated, showing greatly varying characteristics; with none of these substances was critical voltage observed as long as they contained no trace of air; if air is introduced, certain ionization voltage can be found for every compound.

Construction. Report of Sub-Committee on Aerial Cable Construction, T. W. Snell. Jl. of Elec., vol. 52, no. 11, June 1, 1924, pp. 443-445, 3 figs. Relative merits of various types of insulation for overhead conductors, and comparative costs of several types of construction designed to obviate trouble from accidental "grounds" or "shorts" caused by trees in line.

See also High-Tension.

Current-Carrying Capacity. See High-Tension.

Dielectric Losses, Measurement of. Methods of Measuring Dielectric Losses in Three-Phase Current of Very High Tension (Méthodes de mesure des pertes diélectriques en courant triphasé à très haute tension), P. Dapdeville and R. Laroche. Revue Générale de l'Electricité, vol. 16, no. 23, Dec. 6, 1924, pp. 917-922, 5 figs. Describes three-phase installation of Société La Canalisation Electrique, for testing cables under operating conditions, and reviews methods used for measuring dielectric losses.

Faults, Locating of. Finding Defects in Cables (La récherche des defauts de câbles), L. Lagron and P. Mondet. Électricien, vol. 40, no. 1353, Aug. 1, 1924, pp. 337-340, 8 figs. Discusses defects due to contact or to rupture and how to locate them for repair.

Locating Faults in Armored Cables by Means of Electric Oscillations (Localisation des défauts sur les câbles armés au moyen d'oscillations électriques), A. Rauth. Revue Générale de l'Electricité, vol. 16, no. 14, Oct. 4, 1924, pp. 557-558, 1 fig. Use of measure of wave lengths for locating certain defects.

New Measuring Devices for Locating Cable Defects (Nouvelles boites de mesures pour la recherche des défauts de câbles), T. Pausert. Revue Générale de l'Electricité, vol. 16, no. 18, Nov. 1, 1924, pp. 713-716, 5 figs. Particulars of two devices made by Petrier, Tissot & Raybaud Co., one for finding contact of cable with ground or other cable, other for finding breaks in cables.

New Method of Locating Faults With High Intermediate Resistance (Eine neue Fehlerortsmessung bei hohem Uebergangswiderstand), K. Grootoonk. Elektrotechnische Zeit., vol. 45, no. 40, Oct. 2, 1924, pp. 1054-1055, 6 figs. Discusses present methods of locating faults and describes a new method which has given excellent results with very high variable intermediate resistance.

See also Underground.

High-Tension. Current-Carrying Capacity of High-Tension Cables (Contributo agli studii sulla portata dei cavi ad alta tensione), L. Selmo.

Elettrotecnica, vol. 11, no. 8, Mar. 15, 1924, pp. 165-169, 9 figs. Refers to regulations in force in various countries relating to permissible maximum temperatures for paper-insulated high-tension cables, and notes lack of uniformity among them and wide range of values covered. Describes experiments made at Naples upon a 3-phase 9000-volt cable of 60 sq. mm. core section, with object of determining rate of temperature rise under a known current.

High-Tension-Cable Construction (Sui cavi ad alta tensione), E. Soleri. Elettrotecnica, vol. 11, no. 3, Jan. 25, 1124, pp. 54-56, 4 figs. Deals with latest developments of construction; considers specially dielectric rigidity, dielectric losses and power factor and describes different methods of measuring dielectric losses; different materials necessary to manufacture cable and how they should be selected.

High Tension Cables, L. B. Atkinson. World Power, vol. 2, no. 10, Oct. 1924, pp. 218-225, 4 figs. Summary of situation as regards cables up to 11,000 volts, illustrated by two diagrams; properties of dielectrics; process of manufacture of cables; problems arising from geometrical form of cables; economic uses of high-voltage cables; present state of practice. (Abridged.) Paper presented at World Power Conference.

High-Voltage Cables. Elec. World, vol. 83, no. 21, May 24, 1924, pp. 1087-1901, 2 figs. Paper-cable insulation, cable splices and splicing methods, and cable operation. Report presented before Nat. Elec. Light Assn.

Installation and Testing of 66-Kv. Cable. Elec. World, vol. 83, no. 14, Apr. 5, 1924, pp. 667-669, 6 figs. Two subway circuits laid by Cleveland Co. extend 8¼ mi. across city; detailed description of conductors and method of laying; new joint proves very satisfactory.

See also Paper-Insulated; Testing; Underground.

High-Tension, Disconnection of. The Connection and Disconnection of a High-Tension Cable by Means of an Oil Circuit Breaker (Enclenchement et déclenchement d'un câble à haute tension au moyen d'un interrupteur à contacts dans l'huile), J. Fallou. Revue Générale de l'Electricité, vol. 15, no. 11, Mar. 15, 1924, pp. 468-472, 6 figs. Account of series of tests made in Paris on cables of Gennevilliers power system to investigate nature and magnitude of overvoltage created in connecting and disconnecting cable to supply circuit; by means of three-vibrator oscillograph bus voltage, voltage across oil switch, and loading current through cable were measured simultaneously; no overvoltages were recorded upon closing switch; opening, however, gave rise to transient phenomena; author believes that, under certain circumstances, dangerous overvoltages could be eliminated or reduced with step resistance switch.

Installation. Armored Cable Installation Methods, A. L. Abbott. Elec. News., vol. 33, no. 23, Dec. 1, 1924, pp. 37-39, 7 figs. Results of investigation carried out with coöperation of 35 contractors; materials and installation methods for armored cable; installation of boxes; cost records.

Insulating Papers. See PAPER, Insulating.

Joints. Design of High-Tension Cable Joints, C. G. Watson. Elec. World, vol. 84, no. 17, Oct. 25, 1924, pp. 896-897. Points out that original design of cable should be followed when making joints; outlines methods of properly insu'ating conductors.

Kfarup Submarine. See also TELEGRAPHY, Submarine.

Laying. Cable-Laying Under Difficulties. Elec. Rev., vol. 94, no. 2410, Feb. 1, 1924, p. 172, 2 figs. Describes example of electric power cable laying under unusual circumstances and exceptionally difficult conditions, carried out at Lydney, on Severn River.

See also High-Tension; Norway; Submarine; Telephone; Underground.

Lighting. Cables and Conductors for Lighting Circuits With Lamps in Series (Cavi e conduttori per circuiti di illuminazione con lampade in serie), E. D'Angelo. Elettrotecnica, vol. 11, no. 26, Sept. 15, 1924, pp. 635-640, 18 figs. Discusses overhead and underground lines and line losses, different types of cables, and accessories.

Magnetic Field Around. See Submarine.

Maintenance. See Telephone.

Manufacturing Problems. Modern Cable Practice. Elec. World, vol. 83, no. 7, Feb. 16, 1924, pp. 328-331, 8 figs. Comments by representatives of American manufacturers; need of research into insulation problem conceded by leading engineers in this field; latest data on characteristics and test procedure.

Mine Shafts, Suspending. See MINE SHAFTS, Cables, Suspending.

Norway. Laying High-Tension Marine Cables in Norway (Verlegung von Hochspannungs-Seekabeln in Norwegen), F. Hanff. Elektrotechnik u. Maschinenbau, vol. 42, no. 34, Aug. 24, 1924, pp. 513-520, 18 figs. Discusses cable for supplying Aalesund and district with light and power, connecting number of small islands; production of cable by Siemens-Schuckert Works; special protection and anchoring arrangement, cable laying, etc.

Paper-Insulated. High-Voltage Impregnated Paper Cables, Wm. A. Del Mar and C. F. Hanson. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 950-957, 18 figs. Shows that useful conception of danger of air films is that they promote internal surface leakage, and that it is not the case that air films can be detected by slope of voltage-power-factor characteristic; testing of raw and process materials; compounds with and without rosin; hot spots in cables.

Making High-Tension Cables, F. A. Westbrook. Sci. Am., vol. 130, no. 5, May 1924, pp. 324-325 and 367-368, 7 figs. Describes manufacture of paper-wound, oil-impregnated electric cable for underground transmission.

See also High-Tension; Telephone.

Patents. Electricity, Conducting and Insulating. Abridgments of Specifications (Lond.), Class 36, Period 1916-1920, no. 100,001-155,800, class 36 covering electric cables and conductors, electric insulation, lightning conductors, posts and spring drums.

Permalloy-Loaded. Important New Cable Development, F. B. Jewett. Telegraph & Telephone Age, no. 4, Feb. 16, 1924, pp. 83-84. Invention of new alloy called permalloy, and permalloy loaded cable.

Pupin Coils. See CABLES, ELECTRIC, Telephone.

Research Laboratory. See LABORATORIES, Cable Research.

Sag of. Sag of Cables with Double Insulator Chains in Case of Chain Breakages (Durchhang von Seilen mit Doppelabspannketten bei Kettenbruch), H. Bittler. Praktische Maschinen-Konstrukteur, vol. 57, no. 12, Apr. 8, 1924, pp. 156-158, 5 figs. Present approximate methods to calculate sag in case of chain breakages give generally too large values. Using the more exact method described, smaller sags are found and greater distance between cable supporting poles may be permitted.

Single-Conductor, Grounded Sheath Losses. Losses in Grounded Sheaths of Single-Conductor

Cables. H. B. Dwight. Elec. Jl., vol. 21, no. 2, Feb. 1924, pp. 62-66, 2 figs. When sheaths of single-conductor underground cables are grounded or connected together at more than one point, they form closed circuits through which may pass comparatively heavy currents, induced by main currents in power conductors. Describes methods of calculating loss due to these induced sheath currents for non-magnetic sheaths, giving formulas.

Submarine. Installing Cable Across Hudson River, F. A. Westbrook. Elec. Wld., vol. 84, no. 8, Aug. 23, 1924, pp. 355-357, 3 figs. Rocky bottom and swift tidal current necessitate spiral armor of steel tape reinforced with steel wires. Cable laid by tugboat especially adapted to cope with difficulties met in this type of work. Is 2700 ft. in length, and is to carry current from cast side of river to west side for local distribution in immediate vicinity of Garrison.

Laying Submarine Cable Across the Mississippi, L. D. Moore. Ry. Elec. Engr., vol. 15, no. 3, Mar. 1924, pp. 77-80, 9 figs. Describes submarine cable installation made by Missouri Pacific Ry. so that current could be purchased from Union Elec. Light & Power Co., of St. Louis, and transmitted across Mississippi river to Dupo, Ill., where Missouri Pacific's freight yards are located; description of land line connections.

New Method for Repairing Sea Cables (Neue Wege für die Instandsetzung von Seekabeln), A. Kunert. Telegraphen- u. Fernsprech-Technik, vol. 13, no. 7, July 1924, pp. 87-90, 2 figs. Discusses locating of faulty cables by means of a. c. signals, as in pilot cables, and application of apparatus for removing sand when necessary, and gives examples from practice.

The Distribution of the Magnetic Field and Return Current Round a Submarine Cable Carrying Alternating Current. Roy. Soc. of Lond.—Philosophical Trans., vol. 224, nos. A618 and A619, 1924. Part I, by C. V. Drysdale, pp. 95-140, 26 figs.: Importance of knowledge of field round cable for leader gear, and of propagation of electromagnetic impulses in a sea in connection with signalling; propagation of plane electromagnetic waves in a conducting isotropic medium; table of theoretical velocities, wavelengths, and attenuation for various frequencies in sea water; theory of cylindrical conductors; Butterworth's theory for thin conducting lamina; details of recent systematic experimental investigation carried out at Shandon, and account of earlier experiments. Part II, by S. Butterworth, pp. 141-184, 17 figs. partly on supp. plates: Theory of distribution of magnetic field above a submarine cable carrying alternating currents, and its experimental verification by means of a lead model; comparison of theory with measurements made on sea.

The Latest Development of the German Krarup Submarine Cable (Ueber die neueste Entwicklung der deutschen Krarup-Seekabel), E. Schürer. Elektrotechnische Zeit., vol. 45, no. 7, Feb. 14, 1924, pp. 119-120. Discusses latest improvements as exemplified in multicore long Krarup cable recently laid in Baltic Sea.

The New Shisakajima Submarine Cable, K. Kawakami and K. Shimizu. Elec. Communication, vol. 2, no. 4, Apr. 1924, pp. 235-237, 2 figs. Describes power cable 13 miles in length laid in autumn of 1922 between town of Niihama and Shisaka Island; entirely of Japanese design and manufacture and installed by Japanese engineers; physical and electrical properties of cable.

Verification by Calculation of the Effective Locking of Submarine Cable Armoring (Vérification par le calcul de la bonne jointivité de l'armature d'un câble sous-marin), M. Bochas. Annales des Postes Télégraphes & Téléphones), vol. 13, no. 2, Jan. 1924, pp. 183-191, 1 fig. Relation is given which serves to guarantee that cable will not suffer excessive elongations of a damaging nature, while being laid or repaired.

See also Norway; Telegraph; Telephone.

Supertension. Super-Tension Cables, M. C. Timms. Elec. Engr., vol. 1, no. 8, Nov. 15, 1924, pp. 285-289, 3 figs. Considers features of design when single-core cables are intended for operation at supertensions.

Telegraph. Switching on of Homogeneous Cables, with Any End Connection (Das Einschaltproblem für das homogene Kabel bei beliebiger Endschaltung), F. Pollaczek. Elektrische Nachrichten-Technik, vol. 1, no. 3, Sept. 1924, pp. 80-97, 6 figs. Calculations as to current and voltage conditions at any point of cable, and especially in end branches of a cable.

The Application of Radio Engineering Principles to Submarine Telegraph Cables, G. O. Squier. Franklin Inst.—Jl., vol. 199, no. 1, July 1924, pp. 29-56, 10 figs. Discusses adaptation of basic principles and means of radio and application to sub-audio band of frequencies or cable practice; Seattle-Ketchikan cable already shows marked progress; development of automatic telegraph transmitter applicable to radio, land lines and submarine cables, etc.

Telephone. Cable Development and Research, F. L. Rhodes. Bell Telephone Quarterly, vol. 3, no. 1, Jan. 1924, pp. 30-40, 3 figs. Telephone development, pioneer cable experiments, cable construction, and reduction in cost.

Dry-Core Paper Insulated Telephone Cables. Australasian Elec. Times, vol. 3, no. 4, Apr. 28, 1924, pp. 233-235, 6 figs. Describes operations in their manufacture at plant of Mental Manufactures Pty., Ltd., Port Kembla, N. S. W., including materials used.

New Anglo-Dutch Telephone Cable. Electrician, vol. 93, no. 2416, Sept. 5, 1924, pp. 256-257, 4 figs. See also Elec. Rev., vol. 95, no. 2442, Sept. 12, 1924, pp. 384-385, 5 figs. Details of design and methods of manufacture of cable laying in Channel and North Sea establishing telegraphic communication between England and France.

New Telephone Cable in the Simplon (Il nuovo cavo telefonico del sempione), R. A. Mack. Telegrafi e Telefoni, vol. 5, no. 4, July-Aug. 1924, pp. 196-202, 9 figs. Details of cable construction and armoring for lines connecting Milan with Bern and Berlin, etc.

Proper Maintenance of Cable Plant, H. B. Nelson. Telephony, vol. 86, no. 22, May 31, 1924, pp. 12-15, 32 and 34. History of development of telephone cable; construction and maintenance of a modern cable plant; necessity for making periodic inspections; suggestions for preventing trouble.

Telephone Cables for Long Distances and Their Extension (Los cables teléfonicos a gran distancia y su amplificación), D. A. Ebeling. Boletin de la Asociación Argentina de Electrotécnicos, vol. 10, nos. 1-2, 3-4, and 5-6, Jan.-Feb., Mar.-Apr., and May-June 1924, pp. 6-12, 53-56, and 109-114, 9 figs. Discusses introduction of Pupin coils, pupinization of cables; induction, dominant and intercalated; limits of Pupin and Kramp systems, use of cables for long distances.

The Anglo-Dutch Telephone Cable, E. F. Petritsch. Post Office Elec. Engrs.' Jl., vol. 16, Pt. 4, Jan. 1924, pp. 362-379, 8 figs. Describes coil-loaded submarine cable laid between Aldeburgh, Eng., and Domburg, Holland, end of June, 1922; 82.329 naut. miles long; each of the four conductors of cable weighs 160 lb. per naut. mile and dielectric of each conductor 150 lb. Discusses velocity of propagation, attenuation, characteristic impedances of side and phantom circuits, and over-hearing and cross-talk.

The Design and Technical Characteristics of Telephone Cables (Die Bauart und technischen

Eigenschaften der Fernkabel), K. Dohmen. Elektrotechnische Zeit., vol. 45, no. 6, Feb. 7, 1924, pp. 89-91, 3 figs. Describes modern part of 360-mi. subterranean telephone cable between Berlin and Cologne, for which wire sizes of 0.9 mm. and 1.4 mm. diam. were selected; two types of cable have been standardized for new inter-German telephone network, namely, 98-pair and 166-pair cables; innermost two pairs of wires are inclosed in individual lead sheath and represent emergency conductors in case of damage to cable; main data of two cables are given in table.

The London-Bristol Telephone Cable. Elec. Rev., vol. 94, no. 2431, June 27, 1924, pp. 1034-1035, 1 fig. Description of cable, brought into service on June 2, 1924, which is one of main links in network of underground cables which is being laid all over United Kingdom, and of Taplow Station, first repeater station completed for amplifying and relaying by means of thermionic values, current transmitted from terminal telephones.

The Paris-Villecresnes-St. Assise Telephone Cable (Les câbles téléphonignes Paris, Villecresnes, Sainte-Assise), L. Cahen. Revue Générale de l'Electricité, vol. 16, no. 21, Nov. 22, 1924, pp. 833-826, 4 figs. Results of two years' operation of overhead and underground long-distance cables, former giving entire satisfaction mechanically and electrically. Simultaneous telegraphy and telephony, using ground for return.

The Stockholm-Gothenburg Long-Distance Cable (Das Fernsprechkabel Stockholm-Gothenburg), Halden. Elektrotechnische Zeit., vol. 45, no. 40, Oct. 2, 1924, pp. 1057-1059, 5 figs. Particulars of cable laying, ditching machine, transportation of cable, cable specifications, etc.

The Stockholm-Gothenburg Telephone Cable, E. Ekeberg. Elec. Communication, vol. 2, no. 4, Apr. 1924, pp. 202-225, 30 figs. Discusses loading, and telephone repeaters; general considerations of toll cables in Sweden; description of Stockholm-Gothenburg cable, its installation, and repeater stations.

The Testing, Balancing and Jointing of the 160 Pr. 40 Lb. Multiple Twin Telephone Cables Between Germiston and Benoni, A. H. A. Lyle, M. Hewitson, R. C. Hendrie and E. O. Tibbits. S. African Inst. Elec. Engrs.—Trans., vol. 14, Pt. 12, Dec. 1923, pp. 279-294, 8 figs. Notes on loading; cable testing; phantom to side balance; cable balancing, jointing, etc.

The Work of Installation of the Underground Telephone Cable—Milan—Turin—Genoa, G. Magagnini. Elec. Communication, vol. 2, no. 3, Jan. 1924, pp. 192-200, 9 figs. Cable is placed in vitrified clay duct in its passage through cities and through inhabited centers in general, in special iron tubing over numerous bridges, and through other constructions met with along route, and in terra cotta troughing in ordinary road routes.

Transmission Characteristics of Coil Loaded Telephone Cables, K. Ogawa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 431, June 1924, pp. 545-558, 4 figs. Approximately equivalent circuit of loaded cable is derived and it is shown that assumption that capacity of cable between two consecutive loading coils is concentrated at middle point of cable leads sometimes to results with considerable errors. (In Japanese.)

Trunk Telephone Cables, E. A. Beavis. Electrician, vol. 92, no. 2392, Mar. 21, 1924, pp. 348-350, 6 figs. Method of balancing depending upon systematic reduction of "resultant capacity" differences between wires by means of cross-jointing.

Twenty-five Years of German Submarine Telephone Cables. Eng. Progress, vol. 5, no. 4, Apr. 1924, pp. 71-72. Summary of cables put down by German firms in North and Baltic seas, within last 25 years.

Telephone-Telegraph. New Cable for Lake Constance (Ein neues Bodenseekabel), R. Feist. Telegraphen- u. Fernsprech-Technik, vol. 13, no. 8, Aug. 1924, pp. 105-110, 3 figs. Describes connections by wire between Germany and Switzerland by way of Lake Constance; new cable of 28 telephone wires and 6 telegraph wires between Friederichshafen and Romanshorn; construction and testing.

Testing. New Method of Testing High-Tension Cables (Betrachtungen über die von niederländischer Seite vorgeschlagene neue Methode zur Prüfung von Hochspannungskabeln), J. C. van Staveren. Elektrotechnische Zeit., vol. 45, nos. 8 and 9, Feb. 21 and 28, 1924, pp. 129-132 and 159-162, 12 figs. Review of methods heretofore in use, based on investigations of Dutch Standardization Committee; discusses influence of voltage, duration of test, temperature and current load on dielectric losses, based on numerous tests; it is shown that, above all, ionization phenomena should be avoided; describes new testing method proposed by Dutch Standardization Committe, and gives results of tests therewith.

Testing Cable Insulation with High Voltage, M. C. Timms. Elec. Engr., vol. 1, no. 5, Aug. 15, 1924, pp. 163-168, 1 fig. Submarine-cable practice; application to power cables.

See also High-Tension; Telephone.

Testing Sets. D. C. High Voltage Cable Testing Sets, R. Nakamura. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 429, Apr. 1924, pp. 427-442, 16 figs. Describes mechanical rectifier constructed by author and gives results of tests. (In Japanese.)

Three-Core. On the Thermal Resistance Formula of Three Core Sector Shaped Cables, K. Shimizu. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 431, June 1924, pp. 559-563, 3 figs. Approximate expression for calculating thermal resistance of such cables is found theoretically and compared with experimental and graphical values. (In Japanese.)

Underground. Laying Cables Under Highways by Thrust Boring Method, F. G. Bailey. Highway Engr. & Contractor, vol. 11, no. 5, Nov. 1924, pp. 31-32, 2 figs. Describes device developed for boring hole in firm soil for purpose of forming a conduit for cables. By this device it is possible to lay lengths of cables, lead water pipes, etc., without disturbing top surface of a highway, without disorganizing traffic, and without detriment to pavement.

Locating Faults in Underground Cables, V. Truant. Elec. Wld., vol. 84, no. 13, Sept. 27, 1924, pp. 687-688, 4 figs. Application of Wheatstone bridge arrangement to complex networks. Description of apparatus required and general layout. Usefulness of method shown by practical examples.

Transmission Problems, A. M. Taylor. Electrician, vol. 92, no. 2385, Feb. 1, 1924, pp. 128-131, 7 figs. Description of author's hexaphase system by means of which, he claims, transmission of power by underground cables at a cost comparable with that of transmission by overhead lines can be accomplished; designed so that pressures of 120,000 to 150,000 volts can be utilized with underground cables without maximum stress on insulation reaching appreciably higher values than now obtaining on 33,000-volt transmissions; discusses resonance.

Underground Cable Practice in Europe, D. W. Roper. West. Soc. Engrs.—Jl., vol. 29, no. 5, May 1924, pp. 217-224, 7 figs. Outlines European practice with impregnated-paper insulated, lead-covered, underground cables, describing their

methods of installation and operation, processes of manufacture, and cable tests, and gives comparative information from American practice.

Underground Cables of Very High Tension (Cables souterrains à très haute tension), R. Couffon. Revue Industrielle, vol. 54, no. 2175, Feb. 1924, pp. 477-486, 11 figs. Difficulties encountered in production of cables for large systems, with special reference to experiences and results obtained with 3-phase cables for network of l'Union d'Electricité, 137 km. of which are actually in service; comparison of advantages and disadvantages of use of three single-wire cables or a single triple-wire cable in three-phase systems.

Wear at Duct Endings. Comparative Cable Wear with Different Types of Duct Endings, F. L. Rohrbach. Elec. World, vol. 84, no. 16, Oct. 18, 1924, pp. 845-846, 2 figs. Account of experiment made by Wash. Water Power Co. to determine comparative amount of wear on lead sheath of cables with different types of duct endings.

Winding. Winding Machines for Flexible Cables (Note sur les enrouleurs de câbles souples), L. Sabatier. Revue Générale de l'Electricité, vol. 16, no. 7, Aug. 16, 1924, pp. 265-271, 25 figs. Discusses present apparatus used and gives principle of new one characterized by absence of all sliding contact.

CABLES, HOISTING

Dynamic-Load Determination. Dynamic Load of Winding Cables (Die dynamische Beanspruchung der Förderseile), G. Berg. Glückauf, vol. 60, no. 20, May 17, 1924, pp. 400-402, 8 figs. Discusses operations for measuring mechanical course of cable, also processes and trials for determining dynamic forces acting on cables.

Manufacture. Torsion in the Manufacture of Metal Cables (Les questions de torsion dans la fabrication des câbles métalliques), J. Seigle. Revue de l'Industrie Minérale, no. 92, Oct. 15, 1924, pp. 485-501, 30 figs. Principle of cabling machines. Stranding; geometric and physical torsion; fatigue due to torsion.

Safety Factors. Safety Factors for Hoisting Cables (Ein Beitrag zur Frage der Sicherheitszahlen für Förderseile), H. Herbst. Glückauf, vol. 60, no. 17, Apr. 26, 1924, pp. 323-329. Demands of existing German regulations on lifting power of cable; actual safety as compared to calculated safety with large capacities; modification of safety factor in cases of low dynamic stresses.

Wear. Effect of Bending on the Wear of Metal Cables (Influence de l'incurvation sur l'usure des cables métalliques), E. Marc. Arts et Métiers, vol. 77, no. 48, July 1924, pp. 251-255, 1 fig. Discusses bending of cables on pulleys or drums and gives calculation for cables of elevators of Eiffel tower.

CABLEWAYS

Aerial. Cableways and Suspended Railways (Schwebende Drahtseilbahnen und Schienenhängebahnen), M. Buhle. Bautechnik, vol. 2, no. 26, June 17, 1924, pp. 268-288, 88 figs. Describes and illustrates number of types manufactured by A. Bleichert & Co., Leipzig, for passengers and freight, on land and water, and installed in various parts of world.

Bulk-Goods Conveying. Conveying Bulk Goods by Suspended Railways and Cableways (Massengüterbeförderung durch Hänge- und Seilbahnen), E. Singer. Tonindustrie-Zeitung, vol. 48, no. 76, Sept. 20, 1924, pp. 831-834, 6 figs. Describes equipment for conveying materials from open workings, such as clay mines and quarries.

Cable Tramways. See CABLE TRAMWAYS.

Coal-Handling. Taking Coal by the Air Route to Coaling Station. Coal Trade Bul., vol. 51, no. 9, Oct. 1, 1924, pp. 397-399, 4 figs. Aerial tramway at Williamson, W. Va., eliminates two bridges, much track and trestling, cuts hauling costs, and easily handles thousand tons in eight hours.

See also COAL HANDLING, Ropeway System.

Coal-Mine. Aerial Wire Ropeways. J. W. White. Instn. Min. Engrs.—Trans., vol. 67, Pt. 2, May 1924, pp. 114-128, 13 figs. Details of different types designed principally for colliery purposes.

See also COAL MINING, Rock Disposal, Aerial Tramway for.

Coal-Storage Plants. See COAL STORAGE, Systems.

Colliery. See COAL MINES, Refuse Disposal.

Construction. Cableways and Their Importance (Drahtseilbahnen und ihre Bedeutung), W. Landgraeber. Fördertechnik u. Frachtverkehr, vol. 17, no. 23, Dec. 3, 1924, pp. 321-324. Discusses development and construction of overhead cableways, suspended railways, cableways for mine conveying, and overhead railways for mountains.

Electric Suspension. Details of Electric Suspension Railways (Einzelheiten der Elektrohängebahnen), P. Stephan. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 28, June 7, 1924, pp. 606-609, 11 figs. Discusses modern examples of rails, switches and cars.

Explosives, Handling. A Ropeway for Explosives. Engineer, vol. 138, no. 3578, July 25, 1924, pp. 102-104, 15 figs. partly on supp. plate. Describes arrangement of ropeway installed at explosives factory of Cookes Explosives, Ltd., Penrhyndeudraeth, North Wales, for purpose of conveying materials from one to another of the several isolated huts where the various processes are carried on, and also for taking finished materials to a magazine on top of a hill. Difficulties which had to be overcome in designing line.

Jig-Back. Up-to-Date Jig-Back Ropeways, Geo. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 17, Nov. 1924, pp. 475-478, 6 figs. Describes jig-back line built for formation of spoil dumps which, it is claimed, would be efficient in vast majority of cases of spoil disposal; consists of driving terminal, steel lattice mast, intermediate trestle supports, rail and haulage ropes, and automatic tipping carriage.

Longitudinal Profile. The Equilibrium Profile of Cableways (Das Gleichgewichtsprofil der Seilbahn), H. H. Peter. Schweizerische Bauzeitung, vol. 83, no. 5, Feb. 2, 1924, pp. 58-59. Simplified method of determining advantageous longitudinal profile, the so-called theoretical (ideal, compensated) or equilibrium profile.

Portable. "Artex" Portable Ropeway. Indus. Mgmt. (Lond.), vol. 11 (new series), no. 12, June 1924, pp. 325-326, 2 figs. Discusses artex system built on mono-cableway system of transportation, including rope coupling by means of which endless rope track can be shortened or lengthened for altering scope and position of conveyor.

Types. Cables for Aerial Conveying (Etude sur les cables transporteurs aériens), G. Catella. Arts et Métiers, vol. 77, no. 48, Sept. 1924, pp. 321-335, 32 figs. Discusses types of cableway arrangements, types of cable construction, suspended cars, switches, supporting masts, stations, etc.

Cableways (Drahtseilbahnen), Fr. Wernekke. Praktische Maschinen-Konstrukteur, vol. 57, no. 8, Mar. 1, 1924, pp. 79-81, 4 figs. Development of transportation on wire rope is discussed and a few successful installations described, both for passenger and material haulage.

CADMIUM

Compounds, Applications of. Cadmium Compounds in Industry, N. F. Budgen. Chem. Trade Jl. & Chem. Engr., vol. 75, no. 1958, Nov. 28, 1924, pp. 641-643. Use in paints, colors, and glazes. Production of and trade in cadmium sulphide.

Copper-Cadmium Alloy. See COPPER ALLOYS, Copper-Cadmium.

Crystals. See CRYSTALS, Zinc and Cadmium.

Marketing. Marketing of Cadmium, F. E. Wormser. Eng. & Min. Jl.—Press, vol. 118, no. 16, Oct. 18, 1924, pp. 611-612. By-product of smelting operations; applications.

Thermal Expansion. See ZINC, Thermal Expansion.

Uses. The Uses of Cadmium, H. C. Urquhart. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 207-221. Discusses occurrence, physical and chemical properties, cadmium alloys, bearing and antifriction metals, copper alloys, solders and substitute solders, cadmium pigments, etc.

Volumetric Estimation of. Notes on the Volumetric Estimation of Cadmium, J. E. Clennell. Min. Mag., vol. 30, no. 5, May 1924, pp. 270-274. Iodometric method; method developed by author; experimental results; separation of zinc and cadmium.

CAISSONS

[See also FOUNDATIONS, Sinking in Water-Bearing Material.]

Breakwater. See BREAKWATER, Sand-Filled Caissons.

Sinking. Sinking Pier Caissons for Four Missouri River Bridges, L. J. Sverdrup. Eng. News-Rec., vol. 93, no. 16, Oct. 16, 1924, pp. 628-630, 6 figs. Subaqueous difficulties met by Missouri State Highway Dept. on structures now under construction.

Slim Pneumatic Caissons Penetrate Stone-Filled Crib, C. S. Rindsfoos. Eng. News-Rec., vol. 92, no. 22, May 29, 1924, p. 936, 1 fig. In building foundations for new grain elevator for State of New York, 57 caissons were sunk 45 ft. through riprap, in 70 days, some as close together as 12 in.

CALCIUM CARBIDE

Analysis. The Analysis of Calcium Carbide. Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1936, June 27, 1924, p. 769, 1 fig. Describes new American accurate method.

Manufacture. Calcium Carbide Works of the Carbide and Electro Products, Ltd. Indus. Australian & Min. Standard, vol. 71, no. 1834, Jan. 31, 1924, pp. 164-166, 5 figs. Describes the various processes of manufacture at Australian plant.

CALCULATING MACHINES

Cost Accounting. The Mechanical Compilation of Costs. Eng. Production, vol. 7, no. 140, May 1924, pp. 139-141, 5 figs. Describes machines in connection with Powers system, and their performance; system where one clerical entry is required to produce a master from which all subsequent work may be done by mechanical means.

Monroe. Every Machine Piece Given Hardness Test, L. S. Love. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 854-856, 3 figs. Describes some machining operations in manufacture of Monroe calculating machine built by Monroe Calculating Machine Co., Orange, N. J.; carbonized parts subject to test before assembly in machine.

Principles. Calculating Machines (Les machines à calculer), M. D'Ocagne. Annales des Postes Télégraphes et Téléphones, vol. 13, no. 7, July 1924, pp. 726-742. Historic summary dealing with principle of successive machines.

CALORIMETERS

Iron-Mercury. An Iron-Mercury Calorimeter, F. H. Schofield. Jl. of Sci. Instruments, vol. 1, no. 5, Feb. 1924, pp. 141-144, 4 figs. Describes calorimeter which is specially suitable for measuring specific heat of materials of low thermal conductivity which react with water.

Jet. A Jet Calorimeter, W. Payman. Fuel, vol. 3, no. 11, Nov. 1924, pp. 406-407, 1 fig. Instrument consists of two parts, observation chamber, containing burner and scale, and differential manometer.

Measuring Small Heat Intensities. Measurement of Small Heat Intensities: Use of Compensating Microcalorimeter (Mesure des intensités des petites sources de chaleur: emploi d'un microcalorimètre à compensation), A. Tian. Académie des Sciences—Comptes Rendus, vol. 178, no. 8, Feb. 18, 1924, pp. 705-707. Thermally insulated vessel immersed in bath at constant temperature serves as calorimeter; temperature differences between bath and vessel are measured using thermopile and galvanometer.

Micro. Micro-Combustion Bomb and Micro-Calorimeter (Mikroverbrennungsbombe und Mikrocalorimeter), W. A. Roth, H. Ginsberg and R. Lassé. Zeit. für Elektrochemie, vol. 30, no. 9, Sept. 1924, pp. 417-420, 1 fig. Bomb, which has capacity of 21½ cc., is constructed of steel or bronze with inset of superficially brominated silver and has screwed-on head of usual type; special attention is given to compact design of calorimeter vessel, which holds 500 cc. of water, and to efficiency in stirrer; with this apparatus determinations can be carried out on very small quantities of substances.

Recording. A Recording Calorimeter of French Design. Gas. Jl., vol. 165, no. 3175, Mar. 19, 1924, p. 697, 2 figs. New type of calorimeter for determining automatically calorific power of gaseous fuel, introduced in France.

Steam, Bureau of Standards. Calorimeter for Steam Investigations Developed by Bureau of Standards, P. W. Swain. Power, vol. 60, no. 7, Aug. 12, 1924, pp. 246-248, 7 figs. Developed for A. S. M. E. steam research program, insuring utmost reliability.

CALORIMETRY

Saturated Fluids. Calorimetry of Saturated Fluids, N. S. Osborne. Optical Soc. Am.—Jl., vol. 8, no. 4, Apr. 1924, pp. 519-540. Deals with theory of certain calorimetric processes for determination of important thermal properties of saturated fluids, and with interpretation of theory as bearing upon its experimental application.

CALORIZING

Results and Savings Due to. See OIL, Still Tubes, Calorizing of.

Steel. See STEEL, Calorizing.

CAMERAS

Motion-Picture. See MOTION PICTURES, Cameras.

Photographing Moving Projectiles. A Camera for Studying Projectiles in Flight, H. L. Curtis, W. H. Wadleigh and A. H. Sellman. U. S. Bur. Standards—Technologic Papers, no. 255, Mar. 19, 1924, pp. 189-202, 10 figs. partly on supp. plates. Describes camera which will take pictures of objects moving with high speed, and also measure their velocity. Number of pictures depends on number of lenses, 50 pictures per second per lens being easily obtained.

CAMS

Sewing-Machine, Machining. Some Fixtures Used in Machining Sewing-Machine Cams. F. Osgood Hickling. Am. Mach., vol. 61, nos. 20 and 21, Nov. 13 and 20, 1924, pp. 779-780 and 817-818, 8 figs. Nov. 13: Special care exercised in making castings; heavy cuts on small pieces; importance of accuracy of sizes. Nov. 20: Take-up lever cam; fixture for milling cam groove.

CANALS

[See also INLAND WATERWAYS.]

Backwater. See CONDUITS, Backwater and Drop-Down Curves.

Boat Lifts. A New Float Boat Lift (Ein neues Schwimmerschiffshebewerk), G. Ollert and H. Rottmayer. Zentralblatt der Bauverwaltung, vol. 44, no. 28, July 9, 1924, pp. 233-234, 3 figs. Details of design of vertical boat lift using tower and float arrangement in place of counterweight.

The Advantages of Dry Lifting in Lift Locks (Die Vorteile der Trockenförderung bei Schiffshebewerken), Karner. Schiffbau, vol. 25, no. 16, May 28, 1924, pp. 422-430, 12 figs. Points out disadvantages of system heretofore employed of raising ship in water-filled lock, and advantages of so-called dry-lift system, according to which ship is lifted "dry" in elevator framework.

The Problem of Lift Locks for High Lifts (Ueber die Frage von Schiffshebewerken für grosse Hubhöhen), H. Karner. Schiffbau, vol. 25, no. 9, Feb. 13, 1924, pp. 201-204, 4 figs. Describes design based on entirely new principles, showing possibility of constructing lift locks for any given lift.

Germany. Engineering Features of the Construction of the Hunte-Ems Canal from Oldenburg to Kampe (Germany) (Technisches über den Ausbau des Hunte-Ems-Kanals von Oldenburg bis Kampe), Popken. Bautechnik, vol. 2, no. 5, Feb. 1, 1924, pp. 33-36, 11 figs. Soil conditions; construction details and difficulties in marshy land; construction of nine locks.

Joining the Weser and the Main-Danube Territory by Means of the Werra-Main Canal (Ueber die Verbindung der Weser mit dem Main-Donau-Gebiet durch einen Werra-Main-Kanal), M. Contag. Bautechnik, vol. 2, no. 40, Sept. 16, 1924, pp. 446-461, 12 figs. partly on supp. plate. Details regarding new canal connecting Bremen and Regensburg; survey and gradients of line, locks, boat lifts, barrage work, etc.; expected development of Bremen.

The Soil Conditions of the Ems-Weser-Leine Canal (Die Bodenverhältnisse des Ems-Weser-Leine-Kanals), A. Mestwerdt. Zeit. für Bauwesen, vol. 73, no. 10-12, 1923, pp. 261-265, 6 figs. Investigation of soil conditions carried out by author and E. Harbort.

Hydraulic Notch. Calculation of Hydraulic Notch for Channel Control, H. B. Muckleston. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 232-233. Method employed in designing channel construction to maintain constant energy gradient at change of canal grade.

Irrigation. See IRRIGATION, Canals.

Locks. See LOCKS.

Mid-Scotland Project. Iron, Steel, and Kindred Industries, and the Mid-Scotland Ship Canal, J. Stewart. West of Scotland Iron & Steel Inst.—Jl., vol. 31, part 2, Nov., session 1923-24, pp. 13-20 and (discussion) 21-30, 1 fig. Reasons in support of canal; economic advantages; effect on iron industries.

N. Y. State Barge. See HYDROELECTRIC DEVELOPMENTS, N. Y. State Barge Canal.

Panama. See PANAMA CANAL.

Power. The Capacity of Power Canals (Om kraftkanalers kapacitet), A. Löfroth. Teknisk Tidskrift, vol. 54, no. 34, Aug. 23, 1924, pp. 87-89, 4 figs. (Väg- och vattenbyggnadskonst). Relation between volume of water and loss of pressure for different water levels and types of canals is analyzed, and simple method for its determination is given; results of test, diagrams, and tables.

Rhine-Danube. Rhine-Main-Danube Waterway. Times Trade & Eng. Supp., vol. 15, no. 332, Nov. 15, 1924, p. 201, 1 fig. Details of scheme for connection of North and Black Seas; describes works at Viereth on Main River, and Kachlet power station on Danube; effects on trade.

The Rhine-Main-Danube Waterway Scheme, L. C. Hughes-Hallett. World Power, vol. 2, no. 12, Dec. 1924, pp. 323-327, 2 figs. Object of scheme is to create inland shipping route from Rhine estuaries (North Sea) to Danube estuary (Black Sea), which is to convey usual type of large vessels engaged in inland traffic; power development; cost of construction; finance and organization.

Seepage-Loss Measurement. See IRRIGATION, Canals.

Welland. Welland Canal Construction Progress. Can. Engr., vol. 47, no. 26, Dec. 23, 1924, pp. 617-624, 11 figs. Historical review; progress on ship canal during past 12 months; principal features of remaining sections to be constructed.

CANNED FOODS

Tin Containers, Corrosion of. See CORROSION, Tin Food Containers.

CANNING

Technology. The Technology of Canning, Osman Jones. Chem. & Industry, vol. 43, no. 19, May 9, 1924, pp. 139T-142T. Layout of canning factory and departments required; operations; discoloration and metallic contamination.

CAPACITANCE

Calculation. See ELECTRIC CONDUCTORS, Capacitance, Calculation of.

CAR AXLES

Lubrication. Mechanical Lubrication of Car Axles (Die mechanische Schmierung der Eisenbahnachsen), W. Friedrich. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 34, Aug. 23, 1924, pp. 877-879, 7 figs. Details of Schneider-Friedrich system of roller-chain lubrication now being used on all German railway cars, comparative test data of oil-pad and chain lubrication.

CAR COUPLERS

Automatic. Automatic Couplings for Railway Cars (Selbsttätige Kupplung für Eisenbahnfahrzeuge), Castner. Dinglers Polytechnisches Jl., vol. 339, no. 18, Sept. 1924, pp. 177-179, 3 figs. Discusses various designs of railway car couplings and points out superiority of Scharfenberg coupling.

Automatic Couplings in Japan. Ry. Gaz., vol. 40, no. 26, June 27, 1924, p. 926, 3 figs. Imperial Japanese Ry. Administration abandoned English system of coupling, with side buffers and screw couplings and installed mechanical arrangement with M.C.B. coupler of U. S. A. Ingenious arrangement enables ordinary couplings to be combined with automatic couplings under transition conditions.

The Question of Couplings (Das Kupplungsproblem), D. Paap. Verkehrstechnik, vol. 41, nos. 42, 43, and 44, Oct. 17, 24, and 31, 1924, pp. 517-521, 532-535, and 550-551, 19 figs. Discusses importance of the question; advocates auto-

matic central buffers with rigid guide-bar and explains and illustrates various types of couplings.

Types. New Designs of Electric Train Couplings (Neuere Bauformen für elektrische Zugkupplungen), Zeulmann. Glassers Annalen, vol. 95, no. 8, Oct. 15, 1924, pp. 193-201, 20 figs. Describes numerous modern types.

Von Scharfenberg Automatic Railroad Coupling (Die selbsttätige Eisenbahnkupplung von Scharfenberg, P. Paap. Praktische Maschinen-Konstrukteur, vol. 57, no. 10, Mar. 25, 1924, pp. 128-131, 7 figs. Describes coupling, and its great advantages over earlier designs, is always in proper position for automatic connection; air-brake hose is also automatically connected; ring springs act as draft gears.

CAR DUMPERS

Coal Cars. Car Dumper of Unusual Size and Capacity. Iron Age, vol. 114, no. 25, Dec. 18, 1924, pp. 1619-1620, 2 figs. Car dumper, erected for Reading Ry. Co. at Philadelphia, designed for cars carrying 120 net tons of coal; three men handle operation by electric and steam power.

Handling Coal with Gondola Car Dumper at St. Louis, E. H. Kidder. Gas Age-Rec., vol. 53, no. 4, Jan. 26, 1924, pp. 101-102, 3 figs. See also South. Engr., vol. 42, no. 2, Oct. 1924, pp. 56-57, 3 figs. Describes dumper installed at Cahokia plant of Union Elec. Light & Power Co., St. Louis, Mo., designed, manufactured, and erected by Link-Belt Co. of Chicago; made up of two separate structures, one that of two roller rings 24 ft. in diam., and other transfer table or platen upon which car stands.

Coal Handling with. See COAL HANDLING, Car Dumpers.

Design. The Influence of Car Dumpers on Freight Cars (Die Wirkung der Wagenkipper auf die Güterwagen), Schulz. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 16, Apr. 19, 1924, pp. 394-396, 13 figs. Development of car dumpers, their shortcomings and recommendation for improvements.

Grain Unloading. See GRAIN HANDLING, Car Dumper for.

Rotary. Denver & Rio Grande Western Uses Car Dumper. Ry. Age, vol. 77, no. 25, Dec. 20, 1924, pp. 1115-1116, 3 figs. Details of rolling car dumper at Salida, Colo., to transfer coal, ore, and other bulk materials from narrow-gage to standard-gage cars.

Revolving Car Dumper Handles All Sizes of Open Top Cars. Ry. Rev., vol. 74, no. 5, Feb. 2, 1924, pp. 226-228, 4 figs. Details of W-S-M revolving car dumper developed to meet demand for low-capacity machine adaptable to plants where first cost of installation is governing factor, but where high efficiency, low operating cost, and minimum labor are required.

Rotary Car Dumper Used at Cahokia. Elec. World, vol. 83, no. 6, Feb. 9, 1924, p. 286, 1 fig. Gondola coal-car dumper, installed in plant of Union Elec. Light & Power Co., St. Louis, is capable of dumping 50-ton car in one minute and ten seconds with one unskilled attendant and 35-hp. operating motor.

CAR HEATING

Pennsylvania Railroad. The Heating, Ventilating and Lighting of Passenger Cars on the Pennsylvania Railroad, G. L. Fowler. Ry. & Locomotive Eng., vol. 27, no. 9, Sept. 1924, pp. 284-285. Gives outline of work of railroad in development of systems used.

Steam. Tests with Steam Heating of Passenger Cars (Versuche mit Dampfheizung in Personenzügen), M. Mertz. Glasers Annalen, vol. 94, no. 8, Apr. 15, 1924, pp. 93-109, 30 figs. Details of tests carried out by German Testing Bureau with high-pressure and low-pressure systems and various types of cars in special runs of trains, including a train consisting of 22 cars.

Thermostat Equipment. Getting Best Results with Heater Control Equipment, L. P. Hynes. Elec. Ry. Jl., vol. 63, no. 3, Jan. 19, 1924, pp. 97-100, 4 figs. How to install, inspect, test, and maintain mercury thermostat equipment in order to get best operating results and minimize maintenance expense; methods recommended as best by one manufacturer as result of experience on many properties.

CAR HOUSES

Design. Fort Wayne Builds Modern Carhouse. Elec. Ry. Jl., vol. 64, no. 6, Aug. 9, 1924, pp. 191-194, 7 figs. Details of design and construction of car house of Indiana Service Corpn., giving facilities for inspection, repairs, and storage.

Street-Railway. Carhouse for 100 Cars at Louisville, F. H. Miller. Elec. Ry. Jl., vol. 63, no. 11, Mar. 15, 1924, pp. 403-406, 10 figs. Describes new structure, which replaces carhouse burned last year, of reinforced concrete with full sprinkler equipment; through tracks facilitate car movement; novel type of double skeleton pits and facilities for car washing.

CAR LIGHTING

[See also LIGHTING, Train.]

Equipment. Report of Committee on Locomotive and Car Lighting, W. E. Dunham. Ry. Age (Daily Edition), vol. 76, no. 32, June 14, 1924, pp. 1558-1560, 3 figs. Discusses design of axle-generator belt drive and photometry of locomotive headlights. Report presented before Am. Ry. Assn.

Head-End System. Head-End Car Lighting System of the St. Paul, C. R. Gilman. Ry. Elec. Engr., vol. 15, no. 3, Mar. 1924, pp. 73-76, 11 figs. Description of head-end system, as used for electric lighting of passenger trains on Chicago, Milwaukee & St. Paul in contrast with individual car axle system. Running repairs and electric-fan repairs made.

Maintenance Methods. Light, Not Lamps, Determines Economy of Car Lighting, E. E. Dorting. Elec. Ry. Jl., vol. 64, no. 3, July 19, 1924, pp. 80-82, 2 figs. Analysis shows light to be thing purchased in car lighting; old lamps should be discarded; lamps and power for lighting cars cost Interborough Rapid Transit Co. $125,964 per year.

Pennsylvania R. R. See CAR HEATING, Pennsylvania R. R.

CAR SHOPS. See CARS, Shops.

CAR WHEELS

Cast-Iron. The Development of the Cast Iron Car Wheel, Geo. L. Fowler. Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, pp. 367-371, 8 figs. Outline of outstanding features in production of present-day wheel.

Chilled-Iron. The Chilled Iron Car Wheel as an Economic Factor in the Development of Railways in China, E. S. Way. Assn. Chinese & Am. Engrs.—Jl., vol. 5, no. 18, Oct. 1924, pp. 17-28, 3 figs. Analysis of individual items of economy of chilled iron-wheel.

The Chilled Iron Wheel in Railroad Service, E. Ruker. Assn. Chinese & Am. Engrs.—Jl., vol. 5, no. 3, Mar. 1924, pp. 11-16. Evolution, production, and use of this special kind of wheel, and its action in service.

Foundries. See FOUNDRIES, Car-Wheel.

Handling in Repair Shops. Handling Wheel and Axle Work on the Brooklyn-Manhattan Railways, F. H. Colvin. Am. Mach., vol. 61, no. 20,

Nov. 13, 1924, pp. 753-755, 4 figs. How cars are inspected and motor trucks handled when axles or tires require repairs; novel wheel-turning department with storage tracks and hoist for wheels and also for chips.

Rolled-Steel. The Manufacture of Solid Rolled Steel Car Wheels, G. A. Richardson. Ry. Club Pittsburgh—Official Proc., vol. 23, no. 5, Mar. 27, 1924, pp. 119-124 and (discussion) 124-126. Factors influencing delivery times and determining extra costs.

See also LOCOMOTIVES, Tires and Forgings, Manufacture.

Specifications. Report of Committee on Wheels. Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1211-1213, 3 figs. See also Ry. Age (daily edition), vol. 76, no. 36, June 19, pp. 1730-1735 and (discussion), pp. 1734-1737, 3 figs. Cooling of rolled-steel wheels; specifications for cast-iron steel wheels; development of cast-iron wheel design; wheel mounting gage; standard steel-wheel gage; tread-worn hollow wheels; grinding of cast-iron wheels. Report presented to Am. Ry. Assn.

Tires. Modern Production of Railway Wheel Tires (Die neuzeitliche Herstellung von Eisenbahnradreifen). Werkstattstechnik, vol. 18, no. 18, Sept. 15, 1924, pp. 486-489, 14 figs. Methods of Kalker Machine Works in producing sets of wheels and axles, wheel centers, tires, and axles.

The Cause of Tire Fractures (Ueber die Ursache von Radreifenbrüchen), W. Marzahn. Glasers Annalen, vol. 94, no. 4, Feb. 15, 1924, pp. 37-41, 7 figs. Investigations of broken wheel tires showing causes due to faults in material and in workmanship; preventive measures to be observed in steel works and workshop.

The Manufacture of Railway Tires. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 602-603. Account of work done in Sheffield, England, 50 years ago.

Welding of Railway Wheel Tires (Aufschweissen von Radspurkränzen), Gollwitzer. Organ für die Fortschritte des Eisenbalmwesens, vol. 79, no. 11, Sept. 15, 1924, pp. 255-259, 16 figs. partly on supp. plate. Describes method whereby worn tires are being reconditioned by welding of fresh material on worn surface.

Wrought-Steel Gaging of. Gaging Wrought Steel Wheels for Car and Tender, A. Knapp. Ry. Mech. Engr., vol. 98, no. 3, Mar. 1924, pp. 164-167, 13 figs., and (discussion) no 4, Apr. 1924, pp. 224-227. Discussion on use of new A. R. A. steel wheel gage for determining defects, turning wheels and billing. Abstract of paper before Car Foremen's Assn. of Chicago.

CARBOMETER. See STEEL, Carbon-Content Determination.

CARBON

Activated. Activated Carbon (Ueber aktive Kohle), W. Mecklenburg. Zeit. für angewandte Chemie, vol. 37, no. 45, Nov. 6, 1924, pp. 873-877, 4 figs., and (translation) Chem. Age (N. Y.), vol. 32, no. 12, Dec. 1924, pp. 503-505. Discusses production of activated carbon, its use for decoloring, medicine, condensation, and as contact and gas-mask carbon, and its properties and substitutes.

Further Facts about Activated Carbon. Petroleum Times, vol. 12, no. 304, Nov. 1, 1924, p. 708. Action is considered to be both physical and chemical. Abstract of article by H. Kresse in Chemiker Zeitung.

Preparation of Active Carbon from Asphalt and Anthracite by the Action of Iodine (Bereiding van actieve kool nit asphalt en anthraciet door, inverking van jodium), F. J. Nellensteyn. Chemisch Week-blad, vol. 21, no. 46, Nov. 15, 1924, pp. 533-536, 1 fig. Describes method by which yield of active carbon is about 90 per cent of original material, as compared with about 20 per cent by activation with oxygen and steam; low yield by latter process is due to loss of carbon as oxides; theoretical considerations of activation process are discussed.

Animal Constituents. The Animal Constituents of Carbon (Die Tierwelt des Karbons), P. Kukuk. Glückauf, vol. 60, no. 16, Apr. 19, 1924, pp. 299-304, 9 figs. Describes animal remains in anthracite seams with regard to their position in paleozoölogical system.

Estimation in Substances. Determination of Carbon in Fuels, Organic Substances, Refractories and Alloys, E. Goutal. Colliery Guardian, vol. 128, no. 3332, Nov. 7, 1924, pp. 1189-1190, 2 figs. Method devised in compliance with desires expressed at Indus. Heating Congress held in Paris in 1923; based on combustion of test material in oxygen under pressure and estimation of CO_2 by titration, combustion chamber being modification of that employed by author and Mahler for determining carbon content of iron. Translated from Chaleur & Industrie.

Heat of Evaporation. The Heat of Vaporization of Carbon (Sur la chaleur de vaporisation du carbone), de. Forcrand. Académie des Sciences—Comptes Rendus, vol. 178, no. 23, June 2, 1924, pp. 1868-1871. Refers to high value of heat of vaporization of carbon which is obtained by substitution of known boiling-point temperature in formula of Trouton or Nernst modification.

Properties. Carbon and Coke (Kohlenstoff und Koks), D. Aufhäuser. Glückauf, vol. 60, no. 51, Dec. 20, 1924, pp. 1195-1201. Discusses atomic properties, forms and behavior of carbon, capacity for reaction, and combustion.

Resistance. The Variation in the Resistance of Carbon and Graphite with Temperature, B. Noyes, Jr. Physical Rev., vol. 24, no. 2, Aug. 1924, pp. 190-199, 7 figs. Determines resistance between —190 deg. and 2000 deg. Cent.; results do not fit any law; at 2200 deg. Cent. length of carbon rod increased.

Vapor Tension. Vapor Tension of Solid Carbon (Sur le tension de la vapeur du carbone), J. J. van Laar. Académie des Sciences—Comptes Rendus, vol. 178, no. 27, June 30, 1924, pp. 2250-2252. From study of coefficient of dilatation and molecular attraction of graphite, author obtains equation for sublimation temperature, making it clear that sublimation point is considerably above 4200 deg. abs., figure deduced from measurements by Lummer and by Kohn.

CARBON BLACK

Natural Gas, Production from. Carbon Black Produced from Natural Gas in 1923, G. B. Richardson. U. S. Geological Survey (Mineral Resources of U. S. no. 11:11), Sept. 29, 1924, pp. 89-90.

CARBON DIOXIDE

Absorption in Alkaline Solutions. Absorption of Carbon Dioxide and Ammonia from Gas Bubbles, P. G. Ledig. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1231-1233, 8 figs. Deals with continuance of previous work upon absorption.

Rate of Absorption and Equilibrium of Carbon Dioxide in Alkaline Solutions, R. V. Williamson and J. H. Mathews. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1157-1161, 8 figs. Investigation to study factors influencing rate of absorption of CO_2 in alkaline solutions, in order to determine possibility of increasing efficiency of commercial production.

Electrometric Determination. Investigations in Photosynthesis, H. A. Spoehr and J. M. McGee. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924,

pp. 128-130, 1 fig. Electrometric method of determining large quantities of carbon dioxide in air stream.

Meters. See FLUE-GAS ANALYSIS, CO_2 Meters.

Recorders. See FLUE-GAS ANALYSIS, CO_2 and CO Recorders.

CARBON MONOXIDE

Automobile Exhaust Gases. Carbon Monoxide in Motor Car Exhaust Gases. Engineer, vol. 137, no. 3559, Mar. 14, 1924, p. 282. Refers to investigations carried out in New York in garages and in Grand Central Station; foremost authorities on CO poisoning agree that standard recommended for Hudson River tunnel is uniform concentration of 4 parts of CO in 10,000 of air.

Detector and Alarm. Notes on a Carbon-Monoxide Detector and Alarm, J. A. Vaughan. S. African Instn. Engrs.—Jl., vol. 22, no. 7, Feb. 1924, pp. 98-103, 2 figs. Describes instrument intended for automatic detection of small traces of CO in atmosphere, so arranged that a bell is caused to ring when small traces, such as one part in two thousand, or even less, are present in atmosphere supplied to instrument.

Determination. Determination of Carbon Monoxide (Sur le dosage de l'oxyde de carbone), P. Lebeau and Ch. Bedel. Académie des Sciences—Comptes Rendus, vol. 179, no. 2, July 16, 1924, pp. 108-110. Addition of phenolic substances to suspension of cuprous oxide in sulphuric acid increases solubility of former, yielding solution which is good absorbent for CO; addition of water also causes no decomposition or loss of CO.

Determination of Carbon Monoxide in Industrial Gases (Sur le dosage de l'oxyde de carbone dans les gaz industriels), de la Condamine. Académie des Sciences—Comptes Rendus, vol. 179, no. 15, Oct. 16, 1924, pp. 691-692. Solution of 5 parts of cuprous oxide in 100 parts of sulphuric acid absorbs eight times its volume of CO without developing measurable dissociation pressure; this reagent is superior to either ammoniacal or hydrochloric-acid solutions of cuprous chloride.

Elimination from Town Gas. Elimination of Carbon Monoxide from Town Gas. Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 647-650. Practicability of schemes proposed and processes described for partial or complete elimination of carbon monoxide from town gas supply and its replacement by methane.

Hazards from House Heaters. Carbon Monoxide Fatalities From Natural Gas Heaters Investigated by the Bureau of Mines in the Pittsburgh District During the Past Year, G. W. Jones and W. P. Yant. U. S. Bur. Mines—Reports of Investigations, no. 2572, Feb. 1924, 4 pp. List of fatalities investigated, and conclusions of a study to determine what types of heaters liberate CO, why CO is liberated, and how by change of design or construction, liberation of this gas can be largely eliminated.

Carbon Monoxide Hazards From House Heaters Burning Natural Gas, C. W. Jones, L. P. Berger and W. F. Holbrook. U. S. Bur. Mines—Technical Paper no. 337, 1923, 31 pp., 8 figs., partly on supp. plate. Describes tests on six common types of heaters, and results obtained; suggestions for minimizing quantity of carbon monoxide emitted under certain conditions.

Meters and Indicators. See FLUE-GAS ANALYSIS, CO Indicator, and CO Meters.

Poisoning. Carbon Monoxide Poisoning in Homes and Industries, R. R. Sayers. Nat. Safety News, vol. 10, no. 3, Sept. 1924, p. 32. Discusses carbon monoxide poisoning and its prevention. Abstract of paper read before Pac. Safety Conference, San Francisco, Cal.

Carbon Monoxide Poisoning in Private Garages, W. P. Yant, W. A. Jacobs and L. B. Berger. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1047-1049, 1 fig. Determining CO in garage by calculation; tests made by running engines in garage; discussion of tests.

Tests of a Commercial Solution Used to Reduce the Hazard of CO Poisoning in Garages, A. C. Fieldner and W. P. Yant. U. S. Bur. Mines—Reports of Investigations, no. 2594, Apr. 1924, 4 pp. Results of analysis made of a compound sold under a trade name for which claims are reported to have been made regarding its efficacy in reducing CO poisoning in automobile garages, to determine its power to absorb, oxidize, or destroy CO.

The Use of Carbon Dioxide as a Remedy in Gas Poisoning, J. S. Haldane. Colliery Guardian, vol. 128, no. 3339, Dec. 24, 1924, pp. 1633-1634, 2 figs. See also Instn. Min. Engrs.—Trans., vol. 68, pt. 4, Jan. 1925, pp. 271-277, 2 figs., and Iron & Coal Trades Rev., vol. 109, no. 2065, Dec. 26, 1924, pp. 1042-1043, 2 figs. Describes experiments, points out how results may be applied practically in treatment of gas poisoning, and demonstrates main experiments and an apparatus for using carbon dioxide in treatment.

Poisoning, Treatment for. See MINE-RESCUE WORK, Transport of Injured.

CARBON TETRACHLORIDE

Fire Extinguisher. See FIRE EXTINGUISHERS, U. S. Specifications.

CARBONIZATION

Coal. See COAL, Carbonization.

CARBONS. See DIAMONDS, Drill.

CARBORUNDUM

[See also REFRACTORIES, Carborundum.]

Abrasive, Manufacture of. Manufacturing an Artificial Abrasive. Chem. & Met. Eng., vol. 31, no. 13, Sept. 29, 1924, pp. 501-503, 7 figs. Some observations on technology of carborundum manufacture. Design and operation of equipment.

CARBURETORS

Adjustment. Saving Gasoline and Increasing Mileage by Proper Carburetor Adjustment, G. W. Jones and A. A. Straub. U. S. Bur. Mines—Reports of Investigations, serial no. 2616, June 1924, 9 pp. 1 fig. Discusses heat losses due to improper carburetor adjustment.

Beach. Beach Carbureter Is Constant Vacuum Type. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, p. 671, 1 fig. Carburetor of variable venturi or constant-vacuum type with wood float located in float chamber concentric with mixing chamber; makes use of float valve consisting of ball of tobin bronze.

Characteristics of Ideal and Commercial. Comparison of Ideal and Commercial Carbureter-Characteristics, C. S. Kegerreis. Soc. Automotive Engrs.—Jl., vol. 14, nos. 3 and 6, Mar. and June, 1924, pp. 286-301, 21 figs., and (discussion) 609-612, 3 figs. Computed data illustrate car carburetion-requirements of various cars for level-road operation; results of car-test data procured from various sources show information regarding advisability of using straight-line mixtures; data on commercial carburetors; summary of 23 carburetors tested for general conclusions; results give information on effect of air temperatures on metering; 11 devices are compared with ideal carburetor at various car speeds.

Claudel-Hobson. See Zenith.

Heavy-Fuel. New Principle Embodied in Baechler Heavy Fuel Unit. Automotive Indus-

tries, vol. 50, no. 14, Apr. 3, 1924, pp. 757-758, 2 figs. Exceptionally energetic atomization is provided in heavy-fuel carburetor developed in Germany; water is added to mixture and fuel is emulsified with it; prevents detonation at compression pressures which are normally used.

The B. M. W. Heavy-Oil Carburetor (Der B. M. W.-Schweröl-Vergaser), B. Katz. Allgemeine Automobil-Zeitung, vol. 25, nos. 7-8 and 9, Feb. 16 and 26, 1924, pp. 28-29 and 31-32, 3 figs. Describes two types of BMW carburetors which have given excellent results when used in trucks, omnibuses and motor boats.

Schlee. The Fuel Stop of the Schlee Carburetor (Die Kraftstoffbremse des Schleevergasers), H. Wimplinger. Motorwagen, vol. 27, no. 1, Jan. 10, 1924, pp. 2-3, 4 figs. Describes use of fuel stop at light-load nozzle for purpose of automatically stopping supply of fuel from nozzle in manner desired by driver.

Types. Development of the Modern Carburetor (Die Entwicklung der neuzeitlichen Vergaser), M. Wimplinger. Dinglers Polytechnisches Jl., vol. 339, nos. 7, 9 and 12, Apr. 15, May 15, and June 30, 1924, pp. 57-60, 81-82, and 113-114, 16 figs. Principles of carburetion are explained and number of recent carburetor designs are described and illustrated.

Zenith. High-Speed Petrol and Paraffin Engines, J. Okill. Gas & Oil Power, vol. 19, no. 222, Mar. 6, 1924, pp. 107-108, 4 figs. Describes Zenith and Claudel-Hobson carburetors.

The Production of Zenith Carburetors (Die Herstellung des Zenithvergasers), G. Wimplinger. Werkstattstechnik, vol. 18, no. 24, Dec. 15, 1924, pp. 738-739, 13 figs. Methods of machining carburetors of vertical and horizontal type.

The Zenith Carburetor with Graded Atomization (Der Zenith-Vergaser mit stufiger Zerstäubung). Automobil-Rundschau, vol. 23, no. 1, Jan. 1924, pp. 7-8, 1 fig. Describes new Zenith carburetor and principle upon which design is based.

CARGO HANDLING

Ship Loading and Unloading. How There May be Obtained the Greatest Speed in the Mechanical Discharging and Loading of Ships and Barges Burdened With Miscellaneous Cargo, H. McL. Harding. Wld. Ports, vol. 12, no. 7, May 1924, pp. 78-97, 3 figs. Discusses terminal design, slip design, quays, cranes, sheds, etc.

CARNOTITE

Uranium Determination in. A Modified Method for the Determination of Uranium in Carnotite, P. H. M.-P. Brinton and R. B. Ellestad. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1191-1192. Describes method which accomplishes determination with very great saving of time and chemical steps.

CARS

Air Compressor. Mobile, Self-Contained Compressor Car for Railroad Service, C. S. Kulp. Compressed Air Mag., vol. 29, no. 8, Aug. 1924, p. 955, 3 figs. Details of compressor car outfit consisting of two type POV-2 compressors directly connected to 50 hp. engine, single-cylinder horizontal type operating on 4-stroke cycle.

Bearings. See BEARINGS, Anti-Friction; BEARINGS, ROLLER, Railway Rolling Stock.

Brakes. See BRAKES.

Bumpers. See Buffers.

Buffers. A New Construction for Friction Buffers (Eine neue Bauart für Reibungspuffer), C. Wetzel. Schweizerische Bauzeitung, vol. 83, no. 11, Mar. 15, 1924, pp. 128-129, 3 figs. Describes new patented friction buffer offering a resistance of 28 to 34 tons to thrust and requiring a pressure of only about 2 tons to release friction device and return it to initial position.

Comparison of Electric and Hammer Welding for Repairing Buffers (Versuche zur Gegenüberstellung der elektrischen und der Feuerschweissung bei der Wiederherstellung von Puffern), Genzken. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 15, Nov. 15, 1924, pp. 345-346, 2 figs. In Cologne-Nippes Ry. repair shop electric welding proved superior as to quality but dearer due to high cost of current.

Production of Telescope Buffers (Die Herstellung von Hülsenpuffern). Werkstattstechnik, vol. 18, no. 19, Oct. 1, 1924, pp. 531-533, 3 figs. Discusses telescopic buffers as an improvement over plunger buffers and capable of taking greater loads. Details of design and parts.

Purposes and Actions of Railroad Bumpers, Especially Friction Bumpers (Friction Draft Gears) (Aufgaben und Wirkungon des Eisenbahnpuffers unter besonderer Berücksichtigung der Reibungspuffer), Metzkow. Glasers Annalen, vol. 95, no. 6, Sept. 15, 1924, pp. 79-89, 26 figs. Describes plain spring bumpers and the various forms of friction draft gears and bumpers. Superiority of Uerdingen friction bumper and ring spring over all other known designs of such devices were proved by extensive service tests.

Quantity Production of Car Buffers (Reihenfertigung von Eisenbahnpuffern), S. Gans. Werkstattstechnik, vol. 18, no. 19, Oct. 1, 1924, pp. 527-531, 19 figs. Details of design and of processes of manufacture from materials to finished product.

Reinforced Buffers for Railway Cars (Verstärkte Puffer für Eisenbahnfahrzeuge), H. Steber. Kruppsche Monatshefte, vol. 5, Aug.-Sept. 1924, pp. 137-155, 37 figs. Design and construction of new center buffers to be adopted by German Railways and to replace side buffers gradually.

Coal. See CARS, COAL.

Construction Methods. Railway Carriage and Wagon Buildings. Machy. (Lond.), vol. 24, no. 601, Apr. 3, 1924, pp. 1-4, 5 figs. Practice of Cammell Laird & Co.; making buffer forgings—upsetting forging machines; buffer forgings operations.

Couplers. See CAR COUPLERS.

Dumpers for. See CAR DUMPERS.

Dynamometer. Dynamometer Car Used on the Great Western Railway. Ry. Engr., vol. 44, no. 527, Dec. 1923, pp. 466-472, 8 figs. Description of design, equipment and use of car for determining factors in working of locomotives and trains.

Dynamometer Cars of the Swiss Federal Railways (Le wagon-dynamomètre des Chemins de fer fédéraux suisses). Génie Civil, vol. 84, no. 24, June 14, 1924, pp. 571-573, 3 figs. Design and construction of cars; measuring devices and arrangement, including dynamometer, tachometer, anemometer, ergometer, apparatus for measuring drawbar pull, braking force, spreading of rails, etc.

New Dynamometer Car, New York Central R. R. Ry. Rev., vol. 74, no. 15, Apr. 12, 1924, pp. 687-691, 6 figs. Special car contains modern devices for recording locomotive performance.

New York Central Dynamometer Car. Ry. Age, vol. 77, no. 25, Dec. 20, 1924, pp. 1109-1112, 5 figs. Design and equipment of all-steel car in service on N. Y. C. for more than a year.

See also ELECTRIC LOCOMOTIVES, Dynamometer Cars.

Electric-Railway. See ELECTRIC RAILWAYS, Cars.

Elevated-Railway. See ELEVATED RAILWAYS, Cars.

Freight. See CARS, FREIGHT.

Inspection. New Inspection Cars for the Sudan Government Railways. Ry. Gaz., vol. 41, no. 10, Sept. 5, 1924, pp. 318-320, 3 figs. Cars, which are fitted with steel bodies and patent spring trucks are built to complete specification and specially designed to facilitate reërection abroad; length over buffers, 38 ft. 2½ in.; truck wheelbase, 5 ft.; width over side panels, 9 ft. ¼ in.

Interurban. Luxurious Cars for Interurban Service. Elec. Ry. Jl., vol. 64, no. 6, Aug. 9, 1924, pp. 199-201, 5 figs. Describes parlor car and coach built by Milwaukee Electric Ry. & Light Co.; semi-observation front and inclosed observation platform at rear.

Metal Roofs, Reclamation of. Central of Georgia Reclaims Metal Car Roofs, W. H. Harrison. Ry. Mech. Engr., vol. 98, no. 6, June 1924, pp. 329-332, 11 figs. 60 per cent of all sheets removed are restored to service at cost of $10 per car.

Mine. See MINE CARS.

Painting. See PAINTING, Cars.

Parts Interchangeability. Interchangeability of Parts in Railway Cars (Austauschbau bei Eisenbahnwagen), Klein. Zeit. des Vereines Deutscher Ingenieur, vol. 68, no. 37, Sept. 13, 1924, pp. 965-969, 14 figs. Necessity for interchangeability for economic production and repairs of freight and passenger cars, its introduction in Germany, and details of standards.

Passenger. See CARS, PASSENGER.

Refrigerator. See CARS, REFRIGERATOR.

Repairing; Welding and Cutting in. Welding and Cutting in Connection With Car Repairs, H. W. L. Porth. Acetylene Jl., vol. 25, no. 6, Dec. 1923, pp. 286, 288, and 290. Welding of car parts by oxy-acetylene process, and use of cutting torch in car repairing.

Repairs. See RAILWAY REPAIR SHOPS.

Roller Bearings. See BEARINGS, ROLLER, Railway Journal Boxes.

Shops. Improvements in the Johnstown Car Shops, Geo. A. Richardson. Ry. Rev., vol. 74, no. 23, June 7, 1924, pp. 1040-1045, 10 figs. Improvements and additions made by Bethlehem Steel Co. to what were formerly known as Cambria car shops.

Springs. See SPRINGS, Railway-Car.

Steel Castings for, Reclamation of. Reclamation of Cast Steel Car Castings by Arc Welding, H. R. Pennington. Am. Welding Soc.—Jl., vol. 3, no. 4, Apr. 1924, pp. 28-35, 6 figs. Examples of potential savings in reclamation of such parts as coupler bodies, knuckles, truck sides and bolsters for railways, and practice for reclamation of such parts.

Steel, Scrapping. Electric Arc Process for Scrapping Steel Cars, A. M. Candy. Ry. Elec. Engr., vol. 15, no. 4, Apr. 1924, pp. 112-114, 5 figs. Also Ry. Mech. Engr., vol. 98, no. 4, Apr. 1924, pp. 217-219, 4 figs. This method less expensive than others where large number of cars is to be handled. Operating data.

Steel, Straightening Frame. Steel Car Straightening Frame. Ry. Rev., vol. 75, no. 26, Dec. 27, 1924, pp. 1028-1030, 4 figs. Frame introduced for purpose of facilitating straightening of bent parts on steel cars; reduces cost of repair work.

Street-Railway. See STREET RAILWAYS, Cars.

Subway. See SUBWAYS, Cars.

Tank. See CARS, TANK.

Wheels. See CAR WHEELS.

Wooden, Construction. Use, Treatment and Working of Wood in Railway Car Construction (Die Verwendung, Behandlung und Bearbeitung des Holzes im Eisenbahnwagenbau), K. Bässler. Maschinenbau, vol. 3, no. 30, Dec. 24, 1924, pp. 1163-1165. Kinds of wood; use of wood in building construction; stacking, drying, working, assembling, and surface treatment in railway car construction.

CARS, COAL

Dumpers. See CAR DUMPERS.

Gondola. New 70-ton Capacity Gondola Car for the Wabash. Ry. Rev., vol. 75, no. 18, Nov. 1, 1924, pp. 657-659, 3 figs. Drop-end steel gondola car built for shipment of pipe and tubing permits loading to full capacity.

See also Hopper.

Hopper. Determining the Forces Active in an Automatic Unloader Car with Drop Door (Ermittlung der in einem Selbstentladewagen mit Klappenverschluss wirkenden Kräfte), M. Bieck. Glasers Annalen, vol. 95, no. 5, Sept. 1, 1924, pp. 67-71, 16 figs. Calculation of forces acting on walls and on drop bottom; force of automatic action, etc.

57 ½-Ton Hopper Bottom Gondola for C. & O. Ry. Mech. Engr., vol. 98, no. 3, Mar. 1924, pp. 161-164, 6 figs. Stronger and of greater capacity than previous cars of same weight; steel construction; length, 31 ft. 6 in.; width, 10 ft.; height from rail to top of body, 11 ft.

Standard-Gage Fifty-Ton Freight Cars for Transportation of Bulk Goods (Regelspurige 50-t. Eisenbahnwagen zur Beförderung von Massengütern), P. Krüger. Kruppsche Monatshefte, vol. 5, Aug.-Sept. 1924, pp. 171-186, 28 figs. Details of construction of freight cars embodying greatest economy and safety, including trucks, frames, automatic unloading arrangements, etc.

Rating. Commercial Coal Car Rating, W. M. Dake. Min. & Metallurgy, vol. 5, no. 208, Apr. 1924, pp. 179-180. Points out that present system of rating must be revised; proposed system.

20-Ton. The Great Western Railway's 20-Ton Coal Wagons. Colliery Eng., vol. 1, no. 8, Oct. 1924, pp. 364-368, 8 figs. See also Ry. Engr., vol. 45, no. 537, Oct. 1924, pp. 351-353, 5 figs. On each 500 tons of coal conveyed in these wagons there is nearly 400 ft. saving in length of trains; their use increases capacity of private owners' sidings by 30 per cent.

CARS, FREIGHT

Automatic - Unloading. Automatic Unloaders (Selbstentlade-Kübelwagen), Kayser, Verkehrstechnik, vol. 41, no. 48, Nov. 2 8,1924, pp. 623-624, 1 fig. New type of car embodying advantages of automatic unloaders and box cars.

Automobile. See Standard, Pennsylvania R. R.

Ballast. See Hart Convertible.

Boiler Transportation. See BOILERS, Transportation.

Box. Single Sheathed Box Cars for the D. T. & I. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 279-281, 4 figs. U. S. Railroad Administration design modified to provide 1 ft. added height and 1 ft. wider door opening.

60-Ton Capacity S. S. Box Car, Canadian National Rys. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 701-706, 7 figs. Outstanding features are improved end construction, selected lumber material, and its application to prevent leakage of grain.

See also Standard, Pennsylvania R. R.

Coal. See CARS, COAL.

Construction. Bangor & Arostook Car Building Contest. Ry. Age, vol. 76, no. 9, Mar. 1, 1924, pp. 511-513, 6 figs. Box cars, including trucks,

completed by two crews in total time of 94 man-hours each.

Economical Manufacture of Goods Trucks, Werner. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 189-190, 1 fig. Deals with interchangeability of parts and successful introduction of principle in German shops.

Production Methods in British Freight Car Building, D. R. Lamb. Ry. Rev., vol. 74, no. 16, Apr. 19, 1924, pp. 717-722, 10 figs. Consecutive operations in erection of 12-ton open freight cars at Derby shops of Lond. Midland & Scottish Ry.

Rapid Wagon Building in Railway Works. Ry. Gaz., vol. 40, no. 1, Jan. 4, 1924, pp. 11-19, 18 figs. Describes new system installed at Derby Works of Lond. Midland & Scottish Ry. for building clearing house standard 12-ton wagons.

Design. Report of the Committee on Car Construction. Ry. Age (Daily Edition), vol. 76, no. 34, June 17, 1924, pp. 1634-1638 (including discussion), 1 fig. See also Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1186-1189, 1 fig. Reviews objects of fundamentals of design adopted by Association prior to development of present standard box-car designs; development of theoretical basis of car-framing design. Report presented to Am. Ry. Assn.

Foundation Brake Gear. Freight Car Foundation Brake Design, W. G. Stenason. Ry. Rev., vol. 74, no. 21, May 24, 1924, pp. 923-924, 5 figs. Describes form of foundation brake gear, with slack compensating attachment, that has given very satisfactory service. (Abstract.) Paper presented before Air Brake Assn.

Grain. New 40-Ton Bogie Wagons for South African Railways. Ry. Gaz., vol. 40, no. 6, Feb. 8, 1924, p. 167, 2 figs. Principal data of all-steel cars to be used for conveyance of grain in bulk from farming districts to S. African ports; for 3-ft. 6-in. gage; arranged for end or bottom discharge.

Hart Convertible. New Ballast Cars of the Michigan Central R.R. Ry. Rev., vol. 74, no. 10, Mar. 8, 1924, pp. 435-438, 4 figs. Describes Hart convertible car; can be used as a gondola or dump car in ordinary traffic; capacity of 50 tons.

Hot Boxes. Hot Boxes on Freight Cars, E. von Bergen. Car Foremen's Assn. of Chicago—Official Proc., vol. 18, no. 9, Sept. 1924, pp. 18, 21-22, 25-26 and 29, and (discussion) 29-30, 33-34, 37-38, 41-42, 45-46, and 49-52. Discusses problem of combating hot boxes, and methods employed.

Inspection and Maintenance. Inspection and Maintenance of Freight Cars, E. Erickson. Ry. Mech. Engr., vol. 98, no. 2, Feb. 1924, pp. 98-100, 2 figs. Inspection of cars on arrival at receiving yard; cars coming from connections; inspection and repair in classification yards; inspection at miscellaneous loading points; inspection and repair on repair or shop tracks.

Large-Capacity. Experimental 50-Ton Capacity German Freight Cars. Ry. Rev., vol. 74, no. 6, Feb. 9, 1924, pp. 257-259, 3 figs. New types of convertible coal cars developed as adaptations from American practice to meet economic conditions.

Introduction of Large-Capacity Freight Cars (Die Einführung der Grossgüterwagen), Flügel. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 38, Sept. 20, 1924, pp. 977-985, 19 figs. Discusses increase of carrying capacity from 15-20 tons to 50-60 tons, acceleration of circulation of cars, and cheapening of unloading by means of automatic devices; automatic couplings; bunker facilities in free ports; etc.

Logging. Interesting Design of Logging Car. Ry. Rev., vol. 75, no. 3, July 19, 1924, pp. 92-94, 2 figs. Chicago Milwaukee & St. Paul Ry. builds in its own shops skeleton flat cars for logging service.

Production Statistics, 1923. Freight Car Increase Breaks All Records. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 87-93, 1 fig. Railroads devoted 39 per cent of all 1923 capital expenditures to freight cars; gives table of orders in 1923 for service in United States.

Rebuilding. Box Cars Rebuilt in Record Time, D. & H. Co. Ry. Rev., vol. 74, no. 21, May 24, 1924, pp. 913-921, 12 figs. At freight-car rebuilding contest conducted at Oneonta, N. Y., entire superstructure of 60,000-lb. capacity, steel underframe, double-sheathed box car was rebuilt in record time of 52 man-hours.

Repairs. Analysis of the Cost of Freight Car Repairs, J. L. White. Ry. Age, vol. 77, no 1, July 5, 1924, pp. 21-24. Need is evidenced 196 per cent increase in these expenses from 191 to 1922. Difficulties confronting analyst in his study of cost of freight-train car repairs: Suggests a uniform method of reporting to Interstate Commerce Commission supplementary data necessary for an intelligent analysis of freight-car repair costs.

Efficiency in Heavy Freight Car Repairs, H. W. Williams. Ry. Age, vol. 77, no. 18, Nov. 1, 1924, pp. 810-812. Points out that economic problems and traffic demands are important factors in maintenance program; organization, system, and arrangement of facilities.

Unit System for Freight Car Repairs, J. McClennan. Ry. Mech. Engr., vol. 98, no. 7, July 1924, pp. 419-420. Gives proposed form for reporting freight-car repair output for comparison by piece-work-labor cost system; fixed applied piece-work labor costs per car used as basis of output.

Scrapping. Scrapping Steel Freight Cars. Welding Engr., vol. 9, no. 6, June 1924, pp. 21-23, 5 figs. Application of electric-arc cutting process to reclaiming and scrapping of rolling stock.

Standard, Pennsylvania R. R. Pennsylvania Exhibits Standard Cars. Ry. Age (Daily Edition), vol. 76, no. 34, June 17, 1924, pp. 1661-1663, 4 figs. Double-sheathed box and automobile cars among exhibits; single-sheathed frame finished for stock loading.

Standardized. Standardized Freight Rolling-Stock on Irish Railways. Ry. Engr., vol. 45, no. 531, Apr. 1924, pp. 142-147, 14 figs. Alternative designs are provided for metal and timber underframes.

Steel. The Railway Exhibition at Seddin, Berlin. Ry. Gaz., vol. 41, no. 21, Nov. 21, 1924, p. 668, 2 figs. Describes high-capacity all-steel freight car, and special type for bulk goods, both of self-discharging type, but built along different lines.

Steel, Reclaiming and Scrapping of. Electric Arc Process of Reclaiming and Scrapping Steel Freight Cars, A. M. Candy. Am. Welding Soc.—Jl., vol. 3, no. 11, Nov. 1924, pp. 24-31, 4 figs. Results of comparative tests made by one railway in cutting rivets using air guns, oxy-acetylene torches and arc process; typical installations, time required to cut up a car, size of pieces into which a car must be cut, etc.; factors to be considered in planning electrical installation for rivet-cutting or car-scrapping work.

Timber Preservation for. Treating Freight Car Timber Will Cut Repairs, H. S. Sackett. Ry. Age, vol. 77, no. 8, Aug. 23, 1924, pp. 337-339, 1 fig. States that preservation of lumber will add equivalent of 100,000 cars through reduced delays.

Transformer Transportation. New Transformer Cars for the New York New Haven & Hartford R. R. Ry. Rev., vol. 74, no. 15, Apr. 12, 1924, pp. 683-685, 2 figs. 70-ton capacity steel under-

frame transformer cars built by Standard Steel Car Co.; designed to carry load of 150,000 lb. uniformly distributed over length of 24 ft. at center of car.

Truck Frames. Washburn Side Frame for Arch Bar Trucks. Ry. Age, vol. 76, no. 19, Apr. 12, 1924, pp. 937-939, 4 figs. Describes frames of unique design used by Baltimore & Ohio on box and gondola cars.

Trucks. Improved Co-ordinating Six-Wheel Truck. Ry. Age, vol. 77, no. 12, Sept. 20, 1924, pp. 487-489, 5 figs. See also Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 602-604, 6 figs. Describes new truck designed by Boyden Steel Corpn., Baltimore, Md., known as type C-2-S, purpose of which is to reduce curve resistance and permit greater vertical flexibility.

Types Built in 1923. Freight Cars. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 19-44, 65 figs. Representative examples of double-sheathed box, single-sheathed box, single-sheathed automobile and furniture, refrigerator, gondola, hopper, flat, steel tank, and caboose, cars, and of miscellaneous freight car equipment, built in 1923, giving principal dimensions and data, builder, and railroad built for.

CARS, PASSENGER

Articulated. The Jakobs Articulated Passenger-Car System (Gelenkpersonenwagen Bauart "Jakobs"), M. Speer. Glasers Annalen, vol. 95, no. 1, July 1, 1924, pp. 1-9, 12 figs. Details of Jakobs design as patented in 1901 (no. 135,392), application in England, France, etc., and recent design adopted for Berlin suburban lines.

The Articulated Car, W. G. Gove. N. Y. Railroad Club—Proc., vol. 35, no. 1, Nov. 21, 1924, pp. 7441-7461, 17 figs. Description of its design, history, character and methods of construction and operation. Bibliography.

British Empire Exhibition. British Empire Exhibition Railway Material. Engineering, vol. 117, no. 3045, May 9, 1924, pp. 595-601, 13 figs. Exhibits of Birmingham Railway Carriage & Wagon Co., consisting of five passenger cars including two Pullman cars, and electric locomotives built by Metropolitan-Vickers Elec. Co.

Canadian Pacific Ry. Passenger Rolling Stock Additions, Canadian Pacific Railway. Can. Ry & Mar. Wld., no. 319, Sept. 1924, pp. 435-437, 5 figs. Notes on design and construction of buffet parlor cars, cafe parlor cars, first-class cars, and mail and express cars added.

Chilean State Railways. The New Iron Passenger Cars for the Chilean State Railways, M. Strecker. Eng. Progress, vol. 5, no. 8, Aug. 1924, pp. 154-157, 7 figs. Describes technical details of passenger cars made by Breslau Works of Linke-Hoffman-Lauchhammer A. G. for Chilean State Railways.

Design. Improvements in Passenger Car Construction, C. E. Barba. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 479-481. Work of building and maintenance may be facilitated by adopting uniform equipment designs.

Dining. Dining Cars of the Rhine Railway Co. (Restaurationswagen der Rheinischen Bahngesellschaft), M. Schwab. Verkehrstechnik, no. 35a, Sept. 1924, pp. 409-411, 5 figs. Details of design and construction of cars for Düsseldorf-Krefeld line.

New Rolling-Stock for Day East Coast Trains, L.N.E.R. Ry. Gaz, vol. 41, no. 14, Oct. 3, 1924, pp. 439-445, 10 figs. Describes new vehicles, including all-electric "triplet" restaurant-car sets.

Equipment, Canadian Railways. Passenger Car Equipment, Canadian National Rys. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 757-761, 6 figs. Insulation and its application, roof construction, plain and effective interior finish are outstanding features in new steel equipment.

German. Standard Passenger Cars for German State Railways (Die Einheitspersonenwagen der Deutschen Reichsbahn), Speer. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, pp. 957-964, 19 figs. Details of new type replacing individual types of various states.

Heating. See CAR HEATING.

History and Development. History and Development of Passenger Car Building, Geo. A. Richardson. Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1133-1141, 26 figs. Account of history and present facilities of Bethlehem Shipbldg. Corpn., Wilmington, Del., which was pioneer in manufacture of passenger cars.

Lighting. See CAR HEATING, Pa. Ry.; CAR LIGHTING.

Long Island Ry. Features of New Long Island Cars, Elec. Ry. Jl., vol. 63, no. 5, Feb. 2, 1924, pp. 167-170, 7 figs. Framing designed to resist collapse in collision and facilitate repairs when damaged; two motors per car arranged for tap field control; length, 64 ft. 5¾ in.; width, overall, 9 ft. 10 7/16 in.; seating capacity, 78.

Manufacture. The Manufacture of Railway Coaches in Germany, E. Cramer. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 183-189, 20 figs. Quantity production of steel passenger cars; modern truck manufacture; freight trucks for heavy loads; tipping and special trucks; refrigerator cars; central buffer couplings.

Oriental Limited. New Equipment for Oriental Limited Trains. Ry. Age, vol. 76, no. 26, May 31, 1924, pp. 1303-1305, 8 figs. Great Northern cars of improved design to be placed in service between Chicago, Seattle and Portland; equipment of each train will consist of dynamo baggage car, smoking car, first-class coach, Pullman tourist car, dining car, pullman sleepers and observation car.

Painting. Economy in Painting Steel Passenger Cars, G. H. Hammond. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 672-674, 2 figs. 12 years' experience on Soo Line demonstrates practicability and economy of four-coat system.

Parlor. Parlor Car Service. Elec. Traction, vol. 20, no. 7, July 1924, pp. 301-302, 4 figs. Cars were designed and constructed at Highland Park shops of Detroit United Ry.; old trailer cars formerly operating on Pontiac division were converted into parlor cars.

Production Statistics, 1923. Large Progress in Passenger Car Acquisitions. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 83-86, 1 fig. Orders less than in 1922 but otherwise largest since 1916; production largest since 1917; gives table of orders in 1923 for service in United States.

Queensland Government Rys., Australia. New Mail Trains for the Brisbane-Townsville Service, Queensland Government Railways. Ry. Gaz., vol. 40, no. 3, Jan. 18, 1924, pp. 78-81, 8 figs. Three complete trains built, each consisting of eight vehicles: 2 first-class Pullman sleepers, 2 second-class sleepers, 1 composite sleeper, 1 post-office car, 1 mail and luggage van, and 1 guard's van. Brief description of each car.

Side Girders, Shearing Stress in. Shearing Stress in Passenger Car Side Girders, W. J. Meyer. Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 604-608, 12 figs. Analysis of procedure necessary in order to reduce weight without sacrificing strength.

Sleepers. New Canadian National Sleeping Cars. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 27-30, 5 figs. Also Ry. Age. vol. 76, no. 2, Jan. 12, 1924, pp. 189-190. 5 figs. Distinctive floor plan arrangement; frame and exterior of steel; interior finished with wood.

Sleeping Car Service Begun by Interstate Public Service Company. Elec. Ry. Jl., vol. 64, no. 19, Nov. 8, 1924, pp. 801-803, 6 figs. Describes all-steel 10-section sleeping cars placed in service between Indianapolis and Louisville; extra long berths, with windows alongside uppers; large washrooms and easy riding qualities; 62 ft. long and 8 ft. 8½ in. wide; operated on a slow schedule with a layover before entering terminal.

The Oriental Limited—Great Northern Railway. Ry. Jl., vol. 30, no. 7, July 1924, pp. 18-20, 4 figs. Describes new all-steel trains of most modern type built by Pullman Co., embodying latest designs and improvements in sleeping car improvement, in trans-continental service between Chicago and Pacific Northwest cities.

Steel. New Steel Passenger Cars for the Chilean State Railway (Die neuen eisernen Personenwagen für die chilenische Staatsbahn), Strecker. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 19, May 10, 1924, pp. 469-471, 7 figs. Details and construction features of cars built by Linke-Hofmann-Lauchhammer Works, Breslau.

The Passenger Car Up-To-Date, C. E. Barba. New Eng. Railroad Club—Proc., Apr. 8, 1924, pp. 70-81 and (discussion) 81-103. Construction of steel passenger cars; ideals to be considered in up-to-date equipment; tentative specification for painting.

Steel Paneling and Roofing. A New Carriage-Building Development at Swindon, Great Western Railway. Ry. Engr., vol. 45, no. 538, Nov. 1924, pp. 380-385, 11 figs. Modern coaching stock is being fitted as general practice with steel paneling and roofing, result being better and more durable finish. See also Ry. Gaz., vol. 41, no. 19, Nov. 7, 1924, pp. 605-609, 7 figs.

Steel, Suburban. All-Steel Carriages for Sydney Suburban Railways, Commonwealth Engr., vol. 11, no. 5, Dec. 1, 1923, pp. 175-178, 2 figs. Description of car bodies ordered from Leeds Forge Co., England, by New South Wales railway department; contract covers only complete shell of car body, including doors, windows and partitions, but exclusive of bogies, couplings and draft gear, seats, parcel racks and other furnishings, which will be manufactured locally.

Missouri Pacific Acquires Light Suburban Cars. Ry. Age, vol. 76, no. 15, Mar. 15, 1924, pp. 747-749, 4 figs. Design provides strength of through passenger coach; weighs 1000 lb. per seated passenger.

Steel Suburban Cars for Missouri Pacific. Ry. Mech. Engr., vol. 98, no. 4, Apr. 1924, pp. 220-222, 7 figs. Unique seating arrangement provides for 117 passengers, car weight 1000 lb. per seated passenger.

Toronto, Hamilton & Buffalo Ry. New Passenger Equipment for the T. H. & B. Ry. Mech. Engr., vol. 98, no. 7, July 1924, pp. 422-424, 8 figs. Also Can. Ry. & Mar. Wld., no. 317, July 1924, pp. 343-344, 2 figs. 26 all-steel cars to be used in passenger service between Toronto, Ont., and Buffalo, N. Y., were built by Can. Car & Foundry Co., Ltd., Montreal, Que., for Toronto, Hamilton & Buffalo Ry. Equipment consists of 10 first-class coaches, 10 smoking coaches and 6 baggage cars, steel construction and equipped with clasp brakes.

Trucks. The Görlitz Truck (Das Görlitzer Drehgestell). Glasers Annalen, vol. 95, no. 5, Sept. 1, 1924, pp. 71-73, 4 figs. Comparative data on American and Görlitz trucks, the latter having wheelbase of 11.8 ft. as in six-wheel trucks.

Types Built in 1923. Representative Examples of Passenger Train Cars Built in 1923. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 45-49, 17 figs. Illustrations of baggage, baggage-mail, passenger-baggage, passenger, and express refrigerator cars, with data giving principal dimensions, weight, builder, and railroad built for; illustrations of latest Pullman sleeping car equipment.

Ventilation. Ventilation and Heating of Railway Passenger Cars, K. F. Nystrom. Can. Ry. Club—Proc., vol. 23, no. 2, Feb. 1924, pp. 24-62 and (discussion) 62-75, 13 figs. Influence of occupants on temperature and humidity; CO_2 content in relation to ventilation; mechanical refinements required for ideal ventilation; factors essential to economical and efficient ventilation; ventilating systems now in use. Heat losses; heat requirements; radiation surface and fuel required for heating.

CARS, REFRIGERATOR

Canadian Pacific Ry. Canadian Pacific Ry's. Refrigerator Car Construction. Ry. Rev., vol. 75, no. 21, Nov. 22, 1924, pp. 826-828, 3 figs. Insulation and method of its application in cars for dressed-beef service, built in Angus shops.

Chicago Rock Island & Pacific Ry. New Ventilated Refrigerator Cars of the C. R. I. & P. Ry. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 551-557, 9 figs. Special attention given in new equipment to ventilation and insulation to obtain efficient refrigeration; capacity, 40 tons; length over running boards, 42 ft. 6½ in.; width over side sheathing, 9 ft. 2⅝ in.; height from top of rail to top of running boards, 12 ft. 10⅛ in.

Construction. See RAILWAY SHOPS, Car-Building.

French. Refrigerator Cars on the French System (Les wagons frigorifiques), M. A. Sigmann. Revue Générale des Chemins de Fer, vol. 43, no. 6, June 1924, pp. 399-417, 9 figs. Development of refrigerator cars; design and construction of isothermic cars of Orleans Railway; transportation of fruit, meat, milk, etc.

Icing Stations for. Engineering of Refrigeration and Development of Car Icing Stations, J. W. Ingraham. West. Soc. Engrs.—Jl., vol. 29, no. 1, Jan. 1924, pp. 28-32. Fundamental principles of design and operation of plants located at intervals along main lines of trans-continental railroads, for purpose of replenishing ice in refrigerator cars.

Improved Design. New Refrigerator Cars for the Rock Island. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 286-289, 7 figs. Also Ry. Age, vol. 76, no. 10, Mar. 8, 1924, pp. 547-549, 5 figs. Improved side construction has reduced maintenance costs and improved refrigerating efficiency; new method of insulation; Acme ventilation system used.

Insulation. Economical Thickness of Insulation in Refrigerator Cars, A. J. Wood and P. X. Rice. Refrig. Eng., vol. 10, no. 10, Apr. 1924, pp. 357-362 and (discussion) 362-366, 10 figs. Explains a reasonably simple method for determining quickly and accurately most economical thickness of insulation, and discusses factors which enter into economical design of insulated walls.

Low Temperatures in. Low Temperatures in Refrigerator Cars, M. E. Pennington. Ry. Age, vol. 77, no. 21, Nov. 22, 1924, pp. 947-950. Explains why fruit, vegetables and eggs should move at less than 50 deg. fahr.; light salting of ice said to be important.

CARS, TANK

Canadian Pacific Ry. New Tank Cars for Canadian Service. Ry. Rev., vol. 74, no. 8, Feb. 23, 1924, pp. 324-327, 3 figs. Description of cars built by Can. Pacific Ry. to A. R. A. Class III specifications; tank capacity, 12,480 gal.

Development and Manufacture. Modern Tank Car is Industry's Bucket that Goes to the Well, A. S. Taylor. Compressed Air Mag., vol., 29,

no. 3, Mar. 1924, pp. 813-818, 15 figs. Notes on origin, development, and manufacture.

Specifications. Report of Committee on Tank Cars. Ry. Age (Daily Edition), vol. 76, no. 35, June 18, 1824, pp. 1675-1680 and (discussion) 1680-1684, 3 figs. Specifications for Class V and VI tank cars; report on dome covers, bottom-discharge outlets, etc. Report of committee before Am. Ry. Assn. See also Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1175-1177, on committee specifications for Class VI tank cars for transportation of helium gas.

CASE-HARDENING

Case-Depth Measurement. What Is Case Depth? S. P. Rockwell and F. Downes. Am. Soc. Steel Treating, vol. 5, no. 3, Mar. 1924, pp. 285-295 and (discussion) 295-301, 4 figs. Shows variations which are normally obtained by various methods of measuring carburized case depths, using five standard steels under two different lengths of time, handled according to good hardening shop practice; shows necessity for more accurate specifications as regards case depth.

Charcoal for. The Influence of Barium Carbonate upon Wood Charcoal Used for Cementation, B. F. Shepherd. Am. Soc. Steel Treating-Trans., vol. 6, no. 5, Nov. 1924, pp. 606-614, 17 figs. Illustrates effect of barium carbonate in intensifying carburizing properties of wood charcoal; also shows that quantity of barium carbonate which produces best results is not mixture which has been standard since 1861; chrome-vanadium steel is shown to absorb carbon much more readily than simple carbon steel and to produce hypereutectoid zone of such depth and carbon concentration as to be extremely harmful.

Copper Coating in. Prevention of Case-Hardening by Copper Plating, J. C. McCullough and O. M. Reiff. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 611-613, 4 figs. Selective case-hardening by carbon-pack method may be secured by protecting desired parts with copper plating; method can always be relied upon when copper plating is perfect.

Role of Copper in Case Carburizing, O. A. Knight and E. A. Thomas. Forging—Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 17-19, 1 fig. Experimental investigation indicates that action of copper in preventing carburization at operating temperatures is physical rather than catalytic.

Fatigue Resistance and. Case-Hardening and Fatigue Resistance, John Miller. Iron Age, vol. 113, no. 18, May 1, 1924, pp. 1269-1271, 1 fig. Small parts on treatment found superior to alloy steels for automobiles; comparative tests on various steels confirmed by actual results.

Gases Evolved During. Gases Evolved During Carburization, V. E. Hillman. Iron Age, vol. 114, no. 11, Sept. 11, 1924, pp. 611-614, 8 figs. Chemical study of behavior of five solid commercial compounds. Theory of process.

Liquid Baths. A Few Notes on the Shimer Case Hardening Process, B. F. Shepherd. Am. Soc. Steel Treating-Trans., vol. 5, no. 5, May 1924, pp. 485-489 and (discussion) 489-490, 9 figs. Notes on liquid case carburizing of certain steels; curves and photomicrographs showing depths of penetration and structures obtained on S.A.E. 6120 and S.A.E. 1112 steels.

Locomotive Parts. The Case-Hardening of Locomotive Components. Ry. Engr., vol. 45, no. 537, Oct. 1924, pp. 337-338, 1 fig. Deals with alternative steels and case-hardening factors.

Selective. See Copper Coating in.

Steel. Case Hardening Without Warping of Special Steels by Nitrating (Verziehungsfreie Oberflächenhärtung von Sonderstahl durch Nitrieren), Ad. Fry. Kruppsche Monatshefte, vol. 5, Dec. 1924, pp. 266-269, 12 figs. Discusses hardening with nitrogen in place of carbon, which can be done at lower temperature and without subsequent quenching, and is cheaper; numerous examples of application.

The Case-Hardening of Steel, R. N. Richardson. Eng. Production, vol. 7, no. 142, July 1924, pp. 214-215. Discusses heat treatment of case-hardened steel, methods for preventing carburizing of parts, case-hardening compounds, and causes of failure of case-hardened parts.

The Case-Hardening of Steel by Boron and Nitrogen, T. P. Campbell and H. Fay. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 719-723, 5 figs. Experiments on low-carbon steels show that boron penetrates like carbon, but boron steels are less hard; and that nitrogen is more readily absorbed by boron steel than by carbon steel.

CASKS

Washing, Machine for. Cask-Washing Machines. Engineering, vol. 117, no. 3038, Mar. 21, 1924, pp. 367-368, 9 figs. partly on p. 370 and supp. plate. Describes machine for washing casks and process, which is conducted with steam and hot water or liquor, which is introduced to cask through bung-hole.

CAST IRON

Annealing. Tying Gray or White Cast Iron in Knots, B. Stoughton. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 15-21, 16 figs. Radical transformation effected by new but simple heat treatment; machinability a feature of Schaap heat-treating process.

Carbon Control. States Carbon Control Theory, A. C. Porter. Foundry, vol. 52, no. 5, Mar. 1, 1924, pp. 194-195. Sulphur to manganese ratio said to exert regulating influence on amount of carbon in gray cast iron and on ratio of combined to graphitic carbon.

Castings. See IRON CASTINGS.

Chemical Composition, Influence of. Influence of Chemical Composition on Cast Iron. Metal Industry (Lond.), vol. 24, nos. 14, 15, 16, 17, 18, and 19, Apr. 4, 11, 18, 25, May 2 and 9, 1924, pp. 331-333, 355-356, 379-380, 403-405, 431-432, and 455-457, 3 figs. Influence of silicon, sulphur, phosphorus, and manganese; carbon forms and changes under the various conditions of chemical composition and temperature influences.

Chill, Effect on. The Effect of Chill on Cast Iron, E. J. Lowry. Metal Industry (Lond.), vol. 25, no. 19, Nov. 7, 1924, pp. 455-456, 1 fig. Migration effects on cooling resulting in variations of chemical composition through casting; general conclusions and practical significance. (Abstract.) Paper read before Am. Foundrymen's Assn.

Composition and Structure, A.S.T.M. Bar. Notes on Composition and Structure of A.S.T.M. Bar, J. W. Bolton. Foundry Trade Jl., vol. 30, no. 427, Oct. 23, 1924, pp. 349-354, 18 figs. Shows effects of variation in composition and structure on properties of standard bar.

Contraction and Piping. Relation between Contraction and Piping in Cast Iron and the Composition of the Charge, O. Bauer and K. Sipp. Metal Industry (Lond.), vol. 24, no. 4, Jan. 24, 1924, pp. 85-86, 7 figs. Experiments to ascertain relation between contraction and piping in cast iron, and composition of charge, carried out at request of technical committee of German Foundry Assn. Translated from Stahl u. Eisen.

Cooling Effects in. Some Cooling Effects in Cast Iron and Their Correction, R. T. Rolfe. Metal Industry (Lond.), vol. 24, nos. 21, 22 and 23, May 23, 30 and June 6, 1924, pp. 501-502, 525-526 and 551-552, 2 figs. General causes

giving rise to internal stresses in castings and methods of relieving them. Particulars of a series of tests carried out into annealing temperatures. Typical cases in which annealing is resorted to.

Corrosion by Sea Water. See CORROSION, Iron and Steel.

Decomposition by Acid. Acid Decomposes Cast Iron. Foundry, vol. 52, no. 5, Mar. 15, 1924 pp. 231-232, 3 figs. Chemical and physical peculiarities noted in casting which has been subjected to corrosive influence of dilute sulphuric solution covering long period.

Diagram. Cast-Iron Diagram (Ueber ein Gusseisendiagram), E. Maurer. Giesserei-Zeitung, vol. 21, no. 21, Nov. 1, 1924, pp. 457-463, 20 figs. Explains diagram by means of which a cast iron can be produced which is least dependent on cooling conditions, shows pearlitic base in microstructure and has excellent tensile strength.

On a Cast-Iron Diagram (Ueber ein Gusseisen diagram), E. Maurer. Kruppsche Monatshefte, vol. 5, July 1924, pp. 115-122, 20 figs. Discusses formulation of a diagram giving the various structural details of cost iron on lines of Guillet's diagram for special steels, and produces a cast iron largely independent of cooling conditions.

Dilatometric Analysis. Dilatometric Analysis of Alloys, with Special Reference to Cast Iron, P. Chevenard. Foundry Trade Jl., vol. 29, no. 411, July 3, 1924, pp. 3-10, 29 figs. Principles underlying physical analysis; advantages shown by dilatometric method, a method based upon observation of phenomenon of dilation; details of apparatus. Dilatometric properties of constituents of cast iron, directional changes and mutual reactions. Gives dilation diagrams.

Electric-Furnace Manufacture. Electric Furnace Iron Cheap, L. J. Barton. Foundry, vol. 52, no. 2, Jan. 15, 1924, pp. 71-72. Saving effected by use of an all-scrap charge renders electric melting costs lower than for cupola in localities where coke prices are extremely high.

See also Synthetic.

Filtration. The Filtration of Cast Iron, C. Brunelli. Foundry Trade Jl., vol. 30, no. 424, Oct. 2, 1924, pp. 283-286. Describes author's process and discusses principal defects in castings and their causes; impurities in raw materials; action of filter grates; large and small risers; influence of atmospheric air; distribution of useful heat; origin of blowholes. See also editorial, p. 279. Translated from Italian.

Formulas. Cast Iron Formulæ. Metal Industry (Lond.), vol. 25, no. 2, July 11, 1924, pp. 35-37, 3 figs. Use of formulas which purport to give relative proportions of the various constituents, particularly silicon-carbon relations. Criticizes specific formulas which have been proposed. Tenor of author's conclusions seems to be that all such formulas are more dangerous than useful.

Gas and Oxygen Determination in. Gas and Oxygen Determinations in Iron, Especially Cast Iron (Ueber Gas- und Sauerstoffbestimmungen im Eisen, insbesondere Gusseisen), P. Oberhoffer, E. Piwowarsky, A. Pfeifer-Schiessl and H. Stein. Stahl u. Eisen, vol. 44, no. 5, Jan. 31, 1924, pp. 113-116, 5 figs. Oxygen contents in low-carbon steel and cast iron; determination of oxygen from gas contents through hot extraction in vacuum; influence of oxygen contents on properties of cast iron.

Graphitic Softening. The Graphitic Softening of Cast Iron, J. W. Shipley and I. R. McHaffie. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 573-575, 6 figs. Graphitic softening is produced by retention within residual structure of cementite-phosphide eutectic and graphite of some of products of corrosion; wrought iron, steel, and some cast irons corrode out of face and hole, owing to absence of supporting non-corrodible framework.

Graphitization. Properties of Cast Iron, E. Touceda. See also Iron Trade Rev., vol. 74, no. 19, May 8, 1924, pp. 1244-1246, 1 fig. Foundry, vol. 52, no. 9, May 1, 1924, pp. 345-347, 1 fig. Manner and conditions under which graphitization takes place in cast iron has profound influence upon chemical and physical properties of metal; describes special metal made by Ross-Meehan Foundries, Chattanooga, Tenn., called mechanite metal.

The Formation of Graphite in Cast Iron, L. Northcott. Foundry Trade Jl., vol. 29, nos. 409 and 410, June 19 and 26, 1924, pp. 515-521 and (discussion) 548-550, 37 figs. Describes work undertaken in order to examine process of formation of graphite in commercial cast irons. Effect of annealing white cast iron at different temperatures and under such conditions as to produce tempercarbon or nodular graphite. Observations regarding precipitation of carbon. Experiments on a typical gray cast iron of good quality to determine mechanism of formation of flaky or primary graphite as commonly found in gray irons.

The Graphitisation of White Cast Iron, A. Yates, W. J. Diederichs and H. E. Flanders. Metal Industry (Lond.), vol. 25, no. 20, Nov. 14, 1924, pp. 479-480. Mechanism of graphitization; essentials for complete graphitization; shortened treatment adopted; production of intermediate products; commercial considerations of new treatment. (Abstract.) Paper read before Am. Foundrymen's Assn.

Gray, Growth of. Studies Growth of Gray Iron, T. E. Hull. Foundry, vol. 52, no. 7, Apr. 1, 1924, pp. 253-254. Experimental work of Moissan with graphite reviewed and theory for growth of cast iron under repeated heating and cooling is evolved; graphite in iron absorbs gases.

Gray-Iron Alloys. The Analysis of Grey Iron Foundry Alloys. Serial article in Foundry Trade Jl., vol. 30, beginning July 31, and ending Oct. 2, 1924. Methods for analysis of pig-iron, cast iron (castings), ferrosilicon, spiegel, silico-spiegel, and ferro-manganese, which are, in author's opinion, most applicable to gray iron foundry practice.

Gray, Liquid Contraction in. The Problem of the Liquid Contraction in Grey Cast Iron, R. Buchanan. Foundry Trade Jl., vol. 29, no. 411, July 3, 1924, pp. 11-12. Review of subject.

Gray, Structure of. Study Structure of Gray Iron, J. W. Bolton. Foundry, vol. 52, no. 16, Aug. 15, 1924, pp. 628-634, 24 figs. Also Iron Trade Rev., vol. 75, no. 9, Aug. 28, 1924, pp. 544-550, 25 figs.; and Iron Age, vol. 114, no. 12, Sept. 18, 1924, pp. 685-689, 23 figs. Discusses macroscopic and low-power magnification methods which reveal general structure of gray iron and semi-steel; microphotography is considered.

Heat Treatment of. Heat Treatment of Gray Cast Iron, J. W. Bolton. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 820-822, 6 figs. Relieving stresses or softening by annealing, and effect of quenching and drawing.

Some Experiments on Cast Iron, J. W. Donaldson. West of Scotland Iron & Steel Inst.-Jl., vol. 31, part 4, Jan. 1924, pp. 54-57 and (discussion) 58-62, 1 fig. Experiments carried out with view to determining what effect low-temperature heat treatment had on good cylinder iron and on irons of similar composition containing small additions of various elements.

High-Temperature Growth. High-Temperature Growth of Special Cast Irons, J. H. Andrew and H. Hyman. Iron & Steel Inst.—Advance paper no. 2, for meeting May 1924, 10 pp., 11 figs. Investigation to ascertain whether presence of

silicon is necessary factor for growth; exactly what happens to graphite at end of 50 heats; and whether growth can be mitigated or retarded by presence of certain special elements, especially carbide-forming elements, such as chromium and vanadium in small quantities.

High-Tensile. High Tensile Cast Iron, A. Marks. Foundry Trade Jl., vol. 30, no. 436, Dec. 25, 1924, pp. 545-547, 2 figs. Methods of improving tensile strength of cast iron; influence of section; improving matrix; production of pearlitic cast iron.

Improvement by Nickel Introduction. Improving Cast Iron by Introduction of Nickel, P. D. Merica. Can. Foundryman, vol. 15, no. 8, Aug. 1924, pp. 14-15 and 21, 3 figs. Nickel improves machinability of castings, particularly of thin section; increases hardness, produces finer grain and increases resistance to oxidation and corrosion. Bibliography.

Iron-Carbon Eutectoid. Structural Evidence of an Iron-Carbon Eutectoid, A. Hayes and H. E. Flanders. Am. Soc. Steel Treating-Trans., vol. 6, no. 5, Nov. 1924, pp. 623-629, 10 figs. Results of experimental work indicating that carbon existing in solid solution when lower critical range is traversed very slowly is distributed in form of small rounded specks throughout the ferrite; this is considered structural evidence of eutectoid action; gives mechanism for formation of ferrite shell about primary carbon spots, in partially graphitized white iron.

Magnetic Analysis. See MAGNETIC ANALYSIS.

Manufacture. The History of the Manufacture of Cast Iron, T. Makemson. Foundry Trade Jl., vol. 29, no. 392, Feb. 21, 1924, pp. 153-157. Ancient iron workers; ironmaking in Middle Ages, discovery and early uses of cast iron; early use of coke; evolution of blast furnace and foundry; etc.

The Influence of Composition and Rate of Cooling upon the Microstructure and Physical Properties of Cast Iron, H. H. Beeny. Foundry Trade Jl., vol. 29, nos. 401 and 402, Apr. 24 and May 1, 1924, pp. 333-340 and (discussion) 365-366, 24 figs. Deals with constitution and physical properties of iron-carbon alloys as a whole, commencing with pure iron, passing through steels, and ending finally with white cast iron; microstructure of each broad type illustrated. Iron-carbide system and influence of silicon and other elements, and rates of cooling upon this system.

Manganese, Influence of. The Influence of Manganese on Cast Iron, J. E. Hurst. Foundry Trade Jl., vol. 30, no. 430, Nov. 13, 1924, pp. 417-419, 1 fig. Condition of manganese in iron-carbon alloys; influence of manganese in iron-carbon-silicon alloys; hardness and shrinkage; soundness and fluidity.

Manganese and Phosphorus in. Manganese and Phosphorus in Iron and Bronze. Can. Foundryman, vol. 15, no. 5, May 1924, pp. 18-19. Describes the substances and explains their characteristics and effects on other metals.

Melting and Casting. The Melting and Casting of High-duty Irons, F. Hudson. Foundry Trade Jl., vol. 30, no. 434, Dec. 11, 1924, pp. 495-501, 14 figs. By high-duty irons is meant that material used for manufacture of castings which have to withstand both pressure and friction, as in locomotive cylinders; melting in cupola; cupola reactions; carbonizing of metal during descent in cupola; superheating cast iron; conditions for carburization; methods in casting; pouring temperature.

See also ELECTRIC FURNACES, Iron Melting.

Nickel Additions. . Cast Iron Alloyed with Nickel, P. D. Merica. Foundry, vol. 52, no. 4, Feb. 15, 1924, pp. 131-133. See also Iron Trade Rev., vol. 74, no. 8, Feb. 21, 1924, pp. 555-556. Studies of results obtained by additions of nickel in varying percentages; hardness increased and grain structure made more dense.

Nickel Determination in. Analysis of Grey Iron Foundry Alloys. Foundry Trade Jl., vol. 30, no. 432, Nov. 27, 1924, p. 464. Determination of nickel in cast iron; solutions required; estimation.

Non-Magnetic. Non-Magnetic Cast Iron, S. E. Dawson. Foundry Trade Jl., vol. 29, no. 406, May 29, 1924, pp. 439-444, 10 figs. Effect and distribution of constituents; phosphide eutectic; position-of-eutectic experiments; disposition of silicide of iron.

Oxy-Acetylene Cutting. See OXY-ACETYLENE CUTTING, Cast Iron.

Pearlitic. Is the Lanz Method Essential to the Production of Pearlitic Cast Iron? Foundry Trade Jl., vol. 30, no. 417, Aug. 14, 1924, pp. 143-144. Discussion of an article by K. Emmel in Stahl u. Eisen, in which writer asks whether it is indispensable that this particular method should be used in order to get a pearlitic structure in cast iron.

Lauds Pearlitic Cast Iron, C. Irresberger. Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 941-943, 10 figs. Ascribes desirable properties to iron cast under close control as regards analysis and cooling rate; structural differences noted.

Notes on Pearlitic Cast Iron, J. E. Hurst. Foundry Trade Jl., vol. 30, no. 426, Oct. 16, 1924, pp. 327-332, 5 figs. and (discussion) vol. 30, no. 429, Nov. 6, 1924, pp. 400-403. Refers to Professor Bauer's definitions of pearlitic cast iron, and discusses ductility, chemical composition; formation of pearlite; border-line compositions; grain size, and rate of cooling.

Pearlitic Cast Iron. Metal Industry (Lond.), vol. 24, no. 20, May 16, 1924, pp. 477-478. Comments on recent work, including process of Diefenthaler and Sipp, iron-carbon conditions, mechanism of change on slow cooling, etc.

Pearlitic Cast Iron (Perlitguss), K. Emmel. Stahl u. Eisen, vol. 44, no. 13, Mar. 27, 1924, pp. 330-333, 11 figs. Also (abstract) Mech. Eng., vol. 46, no. 6, June 1924, pp. 352-353. Analysis of tests; structure of piston-ring castings; discussion based on article by O. Bauer in same journal (vol. 43, 1923, no. 17, p. 553).

Pearlitic Cast Iron and Its Applications (Perlitgusseisen und seine Anwendungsmöglichkeiten), K. Sipp. Giesserei-Zeitung, vol. 21, no. 17, Sept. 1, 1924, pp. 379-383 and (discussion) 383-385, 11 figs. Also (translation in abstract) Metal Industry (Lond.), vol. 25, no. 18, Oct. 24, 1924, p. 406. Nature and production; advantageous properties; uses.

The Manufacture of Pearlitic Cast Iron for High-Temperature Engines, A. Marks. Foundry Trade Jl., vol. 29, no. 404, May 15, 1924, pp. 406-408, 3 figs. Author's attempts to produce pearlitic cast iron in cupola with a view to obtaining strongest material possible for manufacture of castings for parts subjected to high temperature, such as internal-combustion-engine cylinders, covers and pistons.

Phosphorus, Influence of. The Influence of Phosphorus on Cast Iron, J. E. Hurst. Foundry Trade Jl., vol. 30, no. 431, Nov. 20, 1924, pp. 433-436, 10 figs. Deals with iron and phosphorus; iron, phosphorus and carbon; solidification of commercial phosphoric irons; influence of phosphorus on carbon, on melting point, and on strength properties; network structure; phosphide segregations.

Physical Changes. Physical Changes in Cast Iron due to (i) American Practice; (ii) Secondary Temperatures. Metal Industry (Lond.), vol. 24, no. 10, Mar. 7, 1924, pp. 227-228, 5 figs.

Discusses influence of casting into chill pig molds and water spraying, as in American blast-furnace practice, and influence of secondary or foundry temperatures, that is, remelting iron and subsequent casting.

Porosity. Porosity in Cast Iron, A. Marks. Foundry Trade Jl., vol. 30, no. 412, July 10, 1924, pp. 25-27, 8 figs. Also Metal Industry (Lond.), vol. 25, no. 3, July 18, 1924, pp. 61-62. Discusses graphite, shrinkage, gas, and dirt porosity, and concludes that there is no single cause or cure of porosity in castings. Each case has to be dealt with on first principles, and molding, feeding, chilling, and metal all attended to.

Segregation. Mixtures Closely Controlled. Foundry, vol. 52, no. 1, Jan. 1, 1924, pp. 26-28, 2 figs. Test block cast with two different thicknesses and afterward sawed through center longitudinally indicates segregation of iron under varying conditions.

Semi-Steel. See SEMI-STEEL.

Shrinkage. Shrinkage. Metal Industry (Lond.), vol. 25, no. 3, July 18, 1924, pp. 83-86, 3 figs. Discusses chief phenomena and causes of shrinkage in cast iron. Deals at some length with classic work of Keep.

The Influence of Various Elements on the Shrinkage of Cast Iron and Steel, I. Jaederstroem. Testing, vol. 1, no. 4, Apr. 1924, pp. 290-307, 16 figs. Shows influence on shrinkage exerted by carbon, silicon, manganese, phosphorus, sulphur, nickel and chromium, determined by varying percentage of one element at a time.

Solidification and Cooling, Chemical Equilibria During. Chemical Equilibria During Solidification and Cooling of White Cast Iron, H. A. Schwartz and Anna N. Hird. Am. Inst. Min. & Met. Engrs. —Trans., Advance paper no. 1356-S, July 1924, 4 pp. By analyzing cementite separated electrolytically from white cast iron of known composition and history, distribution of silicon between austenite and cementite during and after freezing has been followed. Results constitute a contribution to our knowledge of equilibria in ternary system iron-carbon-silicon. Information also obtained regarding distribution of manganese, silicon, and phosphorus, when only relatively small amounts of each are present.

Structure. Structure of High-Grade Cast Iron (Das Gefüge hochwertigen grauen Gusseisens), R. Kühnel and E. Nesemann. Stahl u. Eisen, vol. 44, no. 35, Aug. 28, 1924, pp. 1042-1044, 5 figs. Discusses microstructure consisting of pearlite, graphite, and phosphide eutectic; difficulty of distinguishing between this and pearlitic casting.

Sulphur, Elimination from. Sulphur in Cast Iron (Der Schwefel im Gusseisen). Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 33, Aug. 17, 1924, pp. 241-242. Discusses drawbacks of presence of sulphur, recent increase in sulphur content and its causes, and means of reducing it.

Sulphur in Coke and Cast Iron and the Methods Proposed for its Elimination or Neutralisation, J. E. Fletcher. Foundry Trade Jl., vol. 30, no. 432, Nov. 27, 1924, pp. 462-463. Discusses ways and means of abstracting deleterious sulphur from coke and metal during its progress from charging stage to molds.

The Influence of Sulphur in Cast Iron, J. E. Hurst. Foundry Trade Jl., vol. 30, no. 428, Oct. 30, 1924, pp. 377-380, 3 figs. Sulphur in commercial cast irons in presence of sufficient manganese exists almost wholly as sulphide of manganese—MnS; in this form it is practically without influence on structure and properties of cast iron; in absence of sufficient manganese sulphur exists as iron sulphide which is soluble in liquid iron and which has tendency to prevent formation of graphite.

The Influence of Sulphur on Cast Iron (Der Einfluss des Schwefels auf das Gusseisen), C. Röber. Praktischer Maschinen-Konstrukteur, vol. 57, no. 1-2, Jan. 8, 1924, pp. 5-6. Means of reducing sulphur content in finished products; injurious effects of high sulphur content in finished castings; calorimetric determination of sulphur according to Eggertz method.

Synthetic, Electric-Furnace Manufacture of. Manufacture of Synthetic Foundry Iron in the Electric Iron in the Electric Furnace, C. E. Sims, C. W. Williams and B. M. Larsen. Foundry Trade Jl., vol. 30, no. 419, Aug. 28, 1924, pp. 183-185. Carburization difficulties; factors governing carburization; type of furnace and method of operation; costs; etc.

Tensile Strength. Strength of Cast Iron and Its Thickness, W. Rother. Iron Age, vol. 114, no. 6, Aug. 7, 1924, pp. 326-327, 5 figs. Investigation of relation between physical properties as affected by graphitic carbon; arbitration and experimental test bars.

Test Bars, Transverse. Transverse Test-Bars and Engineering Formulae, G. S. Bell and C. H. Adamson. Iron & Steel Inst.—Advance paper no. 4, for meeting. May 1924, 115 pp., 11 figs. Test results show that generally accepted engineering formulas for conversion of transverse test on one sized bar to that on another sized bar do not hold when applied to cast-iron test bars of different sizes; results of tensile and hardness tests.

Testing. Mechanical Tests of Cast Iron. Metal Industry (Lond.), vol. 25, nos. 13 and 14, Sept. 26 and Oct. 3, 1924, pp. 307-309 and 331-332. Consideration of the various classes of tests for determining "strength" properties of the metal.

Physical Tests for Cast Iron, J. Shaw. Foundry Trade Jl., vol. 29, nos. 396 and 397, Mar. 20 and 27, 1924, pp. 226-227 and 262-263, 2 figs. Discusses tests made; present-day specifications; new railway specifications; American conditions; comments on tensile testing; chemical analysis.

Titanium in. The Analysis of Grey Iron Foundry Alloys. Foundry Trade Jl., vol. 30, no. 434, Dec. 11, 1924, pp. 503-504, 1 fig. Titanium in cast iron; estimation of titanium.

Uranium Additions, Effects of. Notes Effects of Uranium on Cast Iron, H. S. Foote. Foundry, vol. 52, no. 3, Feb. 1, 1924, pp. 105-106. Results of tests made in foundries and laboratories of Carnegie Inst. Technology.

Welding. Describes Welding Process, A. H. Jansson. Foundry, vol. 52, no. 11, June 1, 1924, pp. 442-443, 5 figs. Methods used for welding gray or malleable iron castings at comparatively low temperatures said to eliminate excessive oxidation of metal; use of welding compound, discovered by M. A. Abele, Berlin, Germany, in form of dark gray powder, possessing oxidizing properties, but also having property of absorbing oxygen.

Expansion in Iron Castings, D. Richardson. Welding Engr., vol. 9, no. 2, Feb. 1924, pp. 19-20, 4 figs. How distribution of mass in casting determines correct procedure in preheating.

See also ELECTRIC WELDING, ARC, Cast Iron; OXY-ACETYLENE WELDING, Cast Iron, Bronze Welding of.

CASTING

Brass. Casting Brass Plates. Metal Industry (Lond.), vol. 24, no. 26, June 27, 1924, pp. 617-619, 4 figs. Outline of methods. Strictest attention to details, both in molding and melting, is essential for maximum output of commercial castings.

Centrifugal. Centrifugal Casting of Iron Piston Rings, J. A. Rathbone. West. Machy. Wld., vol. 15, no. 9, Sept. 1924, pp. 299-300, 3 figs. Uses of

cores; carbon precipitated as temper carbon on annealing; annealed metal proves excellent for pipe nipples; note on English practice.

Complex Centrifugal Castings, R. L. Binney and N. I. Terbille. Foundry, vol. 52, no. 9, May 1, 1924, pp. 340-343, 5 figs. Intricate hollow objects cast in permanent molds to afford basis of study; experiments were confined entirely to nonferrous field; multiple axes of rotation introduce new problems in making perfect castings.

Scientific Bases of Centrifugal Casting (Ueber die wissenschaftlichen Grundlagen des Schleudergusses), C. Pardun. Stahl u. Eisen, vol. 44, nos. 31, 35, and 40, July 31, Aug. 28, and Oct. 2, 1924, pp. 905-911, 1044-1048, and 1200-1208, 26 figs. Discusses nature and importance of centrifugal force and its application; development and types of centrifugal machines; suggests improvements in mechanical properties; results of tests of centrifugally cast pipes. See also (translation) in Foundry Trade Jl., vol. 30, nos. 424 and 433, Oct. 2 and Dec. 4, 1924, pp. 295-297 and 483-485, 5 figs.

Sheet Bars Cast Centrifugally, L. Cammen. Iron Age, vol. 113, no. 26, June 26, 1924, pp. 1857-1858, 5 figs. Structure of bars and steel rolled from them; physical properties of steel strip made from such bars; economic features.

The Present Status of Centrifugal Casting [Der gegenwärtige Stand des Schleuder- (Zentrifugal-) Gusses], C. Irresberger. Giesserei-Zeitung, vol. 21, no. 18, Sept. 15, 1924, pp. 397-402, 13 figs. Notes on origin; metallurgy; piston rings; horizontal and vertical axis; protection against hardening; annealing; Lavaud process; application for piston rings; production of pressure pipes.

See also PIPE, CAST-IRON, Centrifugally Cast.

Deoxidized Copper Billets. The Casting of Deoxidised Copper Billets, W. E. Ballard. Metal Industry (Lond.), vol. 24, no. 6, Feb. 8, 1924, pp. 121-122 and 124, 1 fig. Details best current practice; particular attention given to use of such billets for tubes, and particular precautions for such a purpose that must be taken in casting.

Lead Alloys. Casting Lead Alloys in Endless Strips. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 610-612, 2 figs. Method used by Hazelett Storage Battery Co., Cleveland, Ohio, in manufacture grids for storage batteries that is applicable in other fields of industry.

Melting and Molding Troubles. Casting Metals, W. J. Reardon. Metal Industry (N. Y.), vol. 22, nos. 1 and 2, Jan. and Feb. 1924, pp. 7-8 and 64, 10 figs. A series of questions and answers dealing with melting and molding troubles and their solutions.

Run-Outs. Run-Outs and Their Remedies, F. C. Edwards. Metal Industry (Lond.), vol. 25, no. 9, Aug. 29, 1924, pp. 203-204, 1 fig. Causes of run-outs, safeguards, and remedies.

CASTINGS

Aluminum. See ALUMINUM, Castings.

Automobile, Cleaning. Cleaning Automobile Castings, B. K. Price. Foundry, vol. 52, no. 9, May 1, 1924, pp. 355-357, 7 figs. Methods employed at Brunswick, N. J., plant of Int. Motors Co.; after tumbling and sand blasting, castings are sent to grinding department; plant makes aluminum crankcases.

Cleaning. Wire Brushes for Cleaning Castings. Mech Wld., vol. 76, no. 1970, Oct. 3, 1924, pp. 212-213. Describes new device which may be attached to any standard portable electric or pneumatic grinder.

Contraction Stress. Contraction Stress: Cause and Remedies, F. C. Edwards. Foundry Trade Jl., vol. 30, no. 435, Dec. 18, 1924, pp. 519-523, 11 figs. Contraction stress is said to be resultant of conflicting forces operating within castings and tending to cause fracture; these forces arise from shrinkage which takes place in castings while cooling; chief means of prevention lies in adopting sound principles of design.

Cooling, Importance of Uniform. The Importance of Uniform Cooling in Castings, F. C. Edwards. Metal Industry (Lond.), vol. 25, no. 22, Nov. 28, 1924, pp. 525-527, 5 figs. Gives two examples in which tensile stress was direct cause of fracture in one case, and shear stress in the other: in both cases stresses had been induced by uneven cooling.

Copper. See COPPER, Castings.

Defects, Causes of. Causes of Defects in Castings of Complex Design, Jas. McIntosh. Iron Age, vol. 114, no. 25, Dec. 18, 1924, pp. 1607-1608. Handling of mold at time of casting, looking to some control of heat treatment, regarded as help in solution of problem cites example of modern cylinder block in automobile engine.

Contraction and Shrinkage Defects in Castings, N. Deane. Metal Industry (Lond.), vol. 25, no. 6, Aug. 8, 1924, p. 134. Discusses main causes and cures of draws, cavities, and cracks in castings, due to cooling effects.

Efficient Design. Efficient Casting Design, F. C. Edwards. Engineering, vol. 117, no. 3040, Apr. 4, 1924, p. 423. Points out that to be really efficient, casting design should tend to reduce operation of molding to its simplest possible terms consistent with ultimate purpose of casting.

Iron. See IRON CASTINGS.

Light. Some Problems in Light Castings, J. C. Dorsie. Foundry Trade Jl., vol. 29, no. 399, Apr. 10, 1924, pp. 299-300, 4 figs. Designing covers for roadway manholes; warping of gutters; behavior of metal in molds.

Malleable. See MALLEABLE CASTINGS.

Pipe. Special Pipe Castings, A. J. Richman. Metal Industry (Lond.), vol. 24, no. 13, Mar. 28, 1924, pp. 307-308 and 310, 5 figs. Describes manufacture of a special pipe casting for a steam turbine and condenser plant. Feature is making of pattern rig and molding operations, illustrating general method of dealing with castings of this nature when only very few are required.

Production. Producing High Test Castings. Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 681-683, 5 figs. Exacting methods employed in producing special lines of castings to comply with rigid specifications. Care exercised in mixtures used, and pouring temperatures.

Some Necessary Adjustments Between the Foundry and Drawing Office, E. Ronceray. Foundry Trade Jl., vol. 29, no. 393, Feb. 28, 1924, pp. 180-183 and (discussion) 183-184, 11 figs. Discusses points for common interest of both foundryman and engineer; requirements of engineer, internal strains in castings, real object of making castings without feeding heads, defects, strength of cast iron, etc.

Production Cost Finding. Finding Actual Cost of Castings, G. B. Cocker. Iron Trade Rev., vol. 75, no. 7, Aug. 14, 1924, pp. 421-422. See also Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 665-666. System devised by southern foundry for determining selling price. Two factors used, namely, actual time required to produce castings and amount of metal needed to pour them.

Production Increase. A Shop Laboratory that Improves the Product, C. O. Herb. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 1-3, 6 figs. How metallurgical laboratory at Niles Tool Works, Hamilton, Ohio, has helped to produce better castings.

Scabbing. Scabbing, F. C. Edwards. Metal Industry (Lond.), vol. 25, no. 19, Nov. 7, 1924,

pp. 453-455, 7 figs. Scabbing is said to be entirely due to fault of molder; main causes of scabbing and means of prevention.

Semi-Steel. See SEMI-STEEL, Castings.

Shrinkage. See MACHINE DESIGN, Casting Shrinkage, Effect on.

Steel. See STEEL CASTINGS.

Structural Weaknesses, Elimination of. The Elimination of Structural Weaknesses in Castings, O. Smalley. Foundry Trade Jl., vol. 29, no. 385, Jan. 3, 1924, pp. 5-11, 15 figs. Deals with structural weaknesses in relation to nature of crystallization of alloy on solidification and design of casting.

Structure of. Surface Structure Versus Inner Structure of Metals, V. N. Krivobok and O. E. Romig. Am. Soc. for Steel Treating—Trans., vol. 6, no. 1, July 1924, pp. 66-76, 11 figs. Discusses structures which appear on surface of cast metals and their relation to inner crystalline organization of metal; variety of surface structures and danger of erroneous conclusions based on them solely.

X-Ray Examination. Hunting Ills with the X-ray, V. E. Hillman. Foundry, vol. 52, no. 6, Mar. 15, 1924, pp. 213-216, 13 figs. Also Iron Trade Rev., vol. 74, no. 17, Apr. 24, 1924, pp. 1103-1106, 13 figs. Diagnosis of castings defects made possible by new application of Roentgen rays; position and character of cavities indicate remedies to adopt in each case.

X-Rays in the Foundry, A. St. John. Foundry Trade Jl., vol. 30, no. 432, Nov. 27, 1924, pp. 460-461, 1 fig. Description of what X-rays are, how they are used for examining castings, and what they disclose, together with consideration of circumstances under which their use is justified. (Abstract.) Paper read before Am. Foundrymen Assn.

CATALYSIS

Copper. The Catalytic Action of Copper. Part IV—The Periodic Variation of the Activity with Temperature of Reduction, W. G. Palmer and F. H. Constable. Roy. Soc.—Proc., vol. 106, no. A-737, Sept. 1, 1924, pp. 250-268, 8 figs. Studies effect of temperature of reduction on activity of copper film catalyst produced by reduction from oxide, and on temperature coefficient of catalytic reaction occurring on its surface.

Heterogeneous. Heterogeneous Catalysis, A. S. Richardson, C. A. Knuth and C. H. Milligan. Indus. & Eng. Chem., vol. 16, no. 5, May 1924, pp. 519-522, 1 fig. Selective action of catalytic nickel in hydrogenation of certain vegetable oils.

Industrial Application of. Present Processes of Catalysis and Their Industrial Application (Les procédés actuels de catalyse et leurs applications industrielles), J. B. Senderens. Technique Moderne, vol. 16, no. 13, July 1, 1924, pp. 437-443. Discusses mechanism of catalysis and catalysis applied in hydrogenation, dehydrogenation, oxidation, hydration, and dehydration.

CATALYSTS

Ammonia-Forming. New Catalyst Developed by United States Chemists, C. E. Williams. Mfrs. Rec., vol. 85, no. 12, Mar. 20, 1924, pp. 69-70, 2 figs. Details of a catalytic substance that brings about fastest known reactions between hydrogen gas and nitrogen gas to form liquid ammonia, developed by Fixed Nitrogen Research Laboratory of U. S. Dept. Agriculture; invaluable in national defense and in manufacture of fertilizers.

Oil-Cracking. Ferrous Selenide as a Contact Catalyst for Cracking, Thos. Midgley, Jr., and C. A. Hochwalt. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 365-366. Preparation of ferrous selenide; method of conducting cracking tests; examination of various oils; results.

CAUSEWAYS

South Carolina. Four-Mile Causeway Carries State Road Over Swamp, J. Pinnell and J. L. Parker. Eng. News-Rec., vol. 93, no. 2, July 10, 1924, pp. 48-51, 5 figs. A causeway, alternately of embankment and concrete trestle, takes road in South Carolina 4½ miles over Santee River. Railway methods and equipment used in construction. Flood conditions add year to construction time.

CEILINGS

Concrete. Steel or Wood Small-Beam Ceiling with Reinforced-Concrete Hourdis Ceiling (Planchers à poutrelles en acier ou en bois avec hourdis en béton armé), F. Chaudy. Génie Civil, vol. 85, no. 4, July 26, 1924, pp. 89-91, 9 figs. Calculation of stresses, etc.

CELITE

Development and Uses. Research Gives Value to Hitherto Little Known Rock Product. Rock Products, vol. 27, no. 6, Mar. 22, 1924, pp. 23-27, 7 figs. Development of new product known as "celite," by Celite Products Co., Lompoc, Cal.; a diatomaceous earth composed almost entirely of silica, having an amorphous structure; its uses.

CELLULOID

Manufacture from Wood Cellulose Nitrate. Wood Cellulose Nitrate as the Material for Celluloid, K. Atsuki. Tokyo Imperial Univ.—Jl. of Faculty of Eng., vol. 15, no. 5, Nov. 1924, pp. 117-192. Reviews briefly most important researches published, and gives results of experiments carried out on use of wood cellulose for manufacture of celluloid.

Stability. The Stability of Celluloid, K. Atsuki. Tokyo Imperial Univ.—Jl. of Faculty of Eng., vol. 16, no. 3, Dec. 1924, pp. 19-46, 1 fig. Results of experiments on effect of heat upon ignition point of celluloid, and ignition time of celluloid; analysis of celluloid, and properties of celluloid used in this research; examples of celluloid fire, and course of spontaneous decomposition of celluloid.

CELLULOSE

Analysis. New Method for Determining α, β, γ Cellulose (Un nuovo metodo per la determinazione delle α, β, γ cellulose). Industria, vol. 38, no. 18, Sept. 30, 1924, pp. 508-509. Gravimetric and volumetric methods; method of determining α-cellulose, $\beta+\gamma$ cellulose, γ cellulose, and by difference, β-cellulose, and gives examples of analyses.

Chlorination. Chlorination of Cellulose (Chloruration de la cellulose), A. dePerdiguier and U. Pomilio. Chimie & Industrie, vol. 11, no. 6, June 1924, pp. 1086-1092, 5 figs. Discusses processes of chlorination, including those of Cataldi, Vains, Pomilio; answering Pomilio's article and reply by Pomilio.

Colloid Chemistry. Colloid Chemistry of Cellulose (Beiträge zur Kolloidchemie der Zellulose), H. Wislicenus and W. Gierisch. Kolloid-Zeit., vol. 34, no. 3, Mar. 1924, pp. 169-181, 4 figs. on supp. plate. Purified cellulose (filter paper) was disintegrated by long-continued milling in dry state in closed porcelain ball mill and in Dreefs steel plate mill; microscopical examination showed that meal obtained has lost all traces of fibrous structure and was in form of minute irregular particles which, especially when moistened, tended to collect into spherical aggregates.

Constitution. The Constitution of Cellulose, A. W. Schorger. Indus & Eng. Chem., vol. 16, no.

12, Dec. 1924, pp. 1274-1275. Discusses older formulas and presents new one.

Determination in Wood. See WOOD, Cellulose Determination.

Formation of Hydrocellulose. Formation of Hydrocellulose (Sur la formation de l'hydrocellulose), H. Gault and B. C. Mukerji. Académie des Sciences—Comptes Rendus, vol. 179, no. 7, Aug. 18, 1924, pp. 402-405, 2 figs. Study of formation of hydrocellulose by action of dilute sulphuric acid on cellulose, increase in copper number being proportional to degradation of cellulose; formation is directly proportional to strength of acid, time and temperature of immersion, and temperature of drying.

Manufacture. Heat Problems in Cellulose Manufacture (Wärmeprobleme in der Zellulose-Fabrikation). Archiv für Wärmewirtschaft, vol. 5, no. 6, June 1924, pp. 111-114, 2 figs. Discusses sulphite and sulphate processes, fuel consumption, steam production and consumption, and heat balances.

More About the De Vains Process, J. Strachan. Paper, vol. 33, no. 17, Feb. 14, 1924, pp. 12-13. Further data about process for manufacture of bleached cellulose.

Polymerization of Molecule. The Polymerization of the Cellulose Molecule (La polymérisation de la molécule cellulosique), P. Bary. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1159-1161. Deals with two different types of reaction undergone by cellulose, involving (1) no depolymerization, and product with colloidal properties similar to those of cellulose, or (2) depolymerization, with product which is less colloidal in its nature than cellulose.

Preparation. Notes on the Preparation of Standard Cellulose, A. B. Corey and H. Le B. Gray. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 853-854. Suggests method for consideration and criticism.

Wood and Cotton. Wood Cellulose. (Zur Kenntnis der Holzcellulose), E. Heuser and S. S. Aiyar. Zeit. für angewandte Chemie, vol. 37, no. 3, Jan. 17, 1924, pp. 27-28. Hypothesis of identity of cellulose obtained from different sources is supported by experiments with cotton cellulose and wood cellulose.

X-Ray Spectrum. X-Ray Spectrum of Cellulose (Röntgenspektrographische Beobachtungen an Cellulose), H. W. Gonell. Zeit. für Physik, vol. 25, no. 2, July 2, 1924, pp. 118-120, 3 figs. It is concluded from structure of individual points in X-ray diffraction patterns of various samples of cellulose that this substance must contain more than one crystalline constituent.

CEMENT

Acceptance Tests. Protection Against Acceptance of Inferior Cements (Selbstschutz gegen Belieferung mit minderwertigen Zementen), O. Colberg. Bautechnik, vol. 2, no. 25, June 13, 1924, pp. 252-255, 1 fig. Discusses sampling on delivery of cement, sand, gravel and broken stone used in concrete work; making of cake sample for quick test, setting test, etc.

Alumina. Aluminous Cement in Practice, T. J. Gueritte. Surveyor & Mun. & County Engr., vol. 65, no. 1685, May 2, 1924, pp. 425-426. See also Contract Rec., vol. 38, no. 49, Dec. 3, 1924, pp. 1197-1198. Deals with practical applications, including practical precautions, effect of temperature, shrinkage, and action of chemicals

Aluminous Cement (''Cement Fondu''), Pure or Mixed (Sand Cement), A. Paris. Concrete, vol. 25, no. 2, Aug. 1924, pp. 69-71. Deals with use in connection with two jobs, one on mountainous ground and other on marsh ground, namely; (1) repairs to Magnacun Tunnel, Rhaetic Railways system, Les Grisons, and (2) construction in reinforced concrete for floor and pile-work, at Villeneuve Gasometer, for Société du Gaz de la Plaine du Rhone, Vevey-Leysin. From paper presented at Int. Cement Congress, Lond., and reprinted from Structural Engr.

Ciment Fondu, G. F. F. Eagar and J. Watson. Colliery Engr., vol. 1, no. 6, Aug. 1924, pp. 259-261, 2 figs. Discusses new kind of cement, giving some account of its qualities and conduct under test.

Ciment Fondu and Mixtures of Ciment Fondu and Portland Cement, W. N. Thomas. Roy. Inst. British Architects—Jl., vol. 31, no. 20, Oct. 18, 1924, pp. 670-675, 11 figs. Results of experiments carried out at Engineering Laboratory, Oxford, England, on influence of water content and temperature upon tensile and compressive strength of alumina cement, and of temperature upon times of initial and final setting; and on setting times, tensile and compression strengths, and soundness of various mixtures of alumina cement and portland cement.

Effect of Quantity of Mixing Water on Heating of Aluminous Cement During Setting (L'Influence de la quantité d'eau de gachage sur l'échauffement, pendant la prise des ciments alumineux), J. Bertet. Génie Civil, vol. 84, no. 23, June 7, 1924, pp. 542-544, 6 figs. See also Concrete, vol. 25, no. 3, Sept. 1924, pp. 92-95, 4 figs. Studies of exothermic reactions accompanying setting of cement.

Fused Alumina Cement, E. C. Blanc. Rock Products, vol. 27, no. 17, Aug. 23, 1924, pp. 37-41, 2 figs. Review of European progress. Bibliography.

German Research on High Alumina Cements, C. R. Platzmann. Rock Products, vol. 27, no. 19, Sept. 20, 1924, pp. 23-25, 3 figs. Gives thoroughgoing study of range of lime-alumina combinations.

The Action of Frost on Ciment Fondu. Engineering, vol. 117, no. 3039, Mar. 28, 1924, p. 393. Results of tests show that elevation of temperature from normal, which is taken as 64 up to 86 deg. fahr., tends to retard actual setting time of ciment fondu.

Burning. Cement Burning, R. K. Meade. Concrete, vol. 25, no. 2, Aug. 1924, pp. 20-23 (Cement Mill Sec.), 1 fig. What takes place in a rotary kiln and what is sought to be accomplished in this. Discussion of the various factors which enter into burning of cement. See also discussion by C. O. Sandstrom in Concrete (Cement Mill Section), vol. 25, no. 5, Nov. 1924, pp. 85-87.

Calcium Sulphate. Calcium Sulphate Cement, C. L. Haddon. Chem. & Industry, vol. 43, no. 3, Jan. 18, 1924, pp. 11T-16T, 1 fig. Objects of research were: (1) To determine number of allotropic modifications of anhydrous calcium sulphate; (2) to explain differences in setting properties from different sources; (3) to examine acceleration of setting by other sulphates; and (4) to investigate nature of intercrystalline adhesion from evidence obtainable from calcium sulphate cement.

Ciment Fondu. See Alumina.

Electric. Properties of Electric Cement and Its Use in the Production of Metallurgical Cement (Ueber die Eigenschaften von Elektrozement und seine Verwendbarkeit zur Herstellung von Hüttenzementen), A. Guttmann. Stahl u. Eisen, vol. 44, nos. 27 and 28, July 3 and 10, 1924, pp. 786-792 and 815-819, 7 figs. Discusses production of portland cement from liquid blast-furnace slag by enriching with lime; economic production of electric cement; analytic, microscopic, and mechanic examination; production of iron portland cement and blast furnace cement from electric cement.

Furnace. Facts You Should Know About Asbestos Furnace Cement, W. P. Werner. Sheet Metal Worker, vol. 15, nos. 8 and 9, May 9 and 23, 1924, pp. 286-288 and 316-318, 9 figs. History of its development; its ingredients; how to abuse it and spoil an otherwise good furnace job; how to use it properly.

High-Grade. Cements of Higher Grade (Höherwertige Zemente), O. Graf. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 33, Aug. 16, 1924, pp. 853-856, 3 figs. Discusses properties of tensile strength in German and other cements, cements of high tensile strength after short period of setting, most important properties of cements, etc.

High-Temperature. See REFRACTORIES, Cements.

Hydraulic. French Specification for Hydraulic Limes and Cement. Eng. Wld., vol. 25, no. 6, Dec. 1924, pp. 376-379, 2 figs. Specification covering test methods, conditions of acceptance, classification of quality, classification according to nature of product, recommendation for requirements of quality, and conditions of delivery. Translated from French.

Hydraulic Cements by Additions of Certain Minerals to Lime, C. R. Platzmann. Rock Products, vol. 27, no. 10, May 17, 1924, pp. 37-38. German experiments and research during last few years.

Magnesium-Oxychloride. Magnesium Oxychloride Cement, J. H. Paterson. Chem. & Industry, vol. 43, no. 9, Feb. 29, 1924, pp. 215-218, 1 fig. Important features and applications; mechanism of setting and factors which control it.

Plastic Magnesia Cements, A. P. Sachs. Asbestos, vol. 5, no. 12, June 1924, pp. 5-12. Describes new cement known as Sorel's oxychloride cement, having very great strength and very high bending power. Chemical nature has not been established with certainty but is believed to be hydrated basic magnesium oxychlorid. 3 Mg O Mg Cl_2. 10 H_2 O.

What is Good Magnesium Oxychloride Cement? H. L. Olin and B. H. Peterson. Chem. & Met. Eng., vol. 31, no. 7, Aug. 18, 1924, pp. 266-267. Effects of adding free lime and calcium carbonate studied and causes of weakening of cement in case of former investigated.

Manufacture. See CEMENT MANUFACTURE.

Mills. See CEMENT MILLS.

Portland. See CEMENT, PORTLAND.

Rapid-Setting. A New Cement (Un nouveau ciment). Revue des Matériaux de Construction & de Travaux Publics, no. 172, Jan. 1924, pp. 1-4, 3 figs. Also (translation) Rock Products, vol. 27, no. 4, Feb. 23, 1924, pp. 40-41, 3 figs. Describes new rapid-hardening slag cement and compares its resistance with that of other slag cements commonly employed, showing economy of former.

Rapid-Setting Cements (Les ciments à durcissement rapide), P. Prevost. Revue Industrielle, vol. 54, no. 2183, Oct. 1924, pp. 305-311, 10 figs. Particulars of Louve cement, manufactured by Société Générale des Chaux et Ciments, and of fused cement of Société Pavin de Lafarge, including raw materials, composition, results of chemical and mechanical tests, and use.

Roman. Roman Cement (Romanzement), O. Schmidt. Tonindustrie-Zeitung, vol. 48, no. 86, Oct. 25, 1924, pp. 967-969. Particulars of cement invented by Parker, including production and composition, and comparison with portland cement.

Special. Special Cements and the Future of Reinforced Concrete (Les ciments spéciaux et l'avenir du béton armé), H. Lossier. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 123, no. 9, Nov. 1924, pp. 738-756, 4 figs. Discusses slow- and quick-setting cements; use of special cements in architectural work, naval construction, hangars for airships, etc.

Spraying. Restoration of Sarotti Factory Damaged by Fire by Cement Spraying Process (Die Wiederherstellung der brandbeschädigten Fabrik Sarotti durch das Betonspritzverfahren), E. G. Friedrich. Schweizerische Bauzeitung, vol. 83, no. 24, June 14, 1924, pp. 278-280, 6 figs. Reinforced-concrete chocolate factory very badly damaged by fire was entirely restored by additional reinforcing and cement spraying; results of tests.

See also CEMENT GUN; CONVEYORS, Building-Construction.

Statistics. Cement in 1922, E. F. Burchard and B. W. Bagley. U. S. Geol. Surv., no. II:26, Dec. 31, 1923, pp. 227-249, 1 fig. Statistics covering production, consumption, prices, manufacturing conditions, and foreign trade.

International Trade in Cement—Europe, R. M. Santmyers. Trade Information Bul. (Supp. to Commerce Reports), no. 213, Mar. 17, 1924, 38 pp. Statistics on production, exports, imports, etc., of different countries.

Storage Warehouses. Square and Triangular Cement Storage Warehouses. Eng. News-Rec., vol. 92, no. 5, Jan. 31, 1924, p. 185, 1 fig. Floor in one placed on cinder fill saves $45,000; in other, moisture condensation limited by minimum openings.

Tests. Experiments With High-Grade Cements (Versuche mit hochwertigen Zementen), K. Bonn. Beton u. Eisen, vol. 23, no. 21, Nov. 5, 1924, pp. 281-283, 3 figs. Particulars of bending tests with two slabs 3.62 m. by 12 cm. and 10 mm. thick, of 1:5 cement, hand mixed; theoretical load of 150 kg. per sq. m. increased to 225 kg. per sq. m.

Tabulation of Results of Cement Tests by the Vienna Municipal Building Board (Teilweise Zusammenstellung der Zementprüfungsergebnisse im Stadtbauamte Wien 1924), Hasch. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 45-46, Nov. 14, 1924, pp. 400-401, 1 fig. Chart giving compression strength in kg. per sq. cm. and days for setting, for portland, fusion, and special cements.

CEMENT GUN

Mines, Application in. Spraying With Cement Guns the Walls of Passages and Shafts in Dutch Mines (Het bespuiten met beton van mijngangwanden en betimmeringen in het Nederlandsche mijndistrict), W. H. D. De Iongh. Ingenieur, vol. 39, no. 12, Mar. 22, 1924, pp. 207-209, 4 figs. Describes cement gun, and its application to interior passages and chambers in mines. Cement covering makes mine timber fireproof.

CEMENT MANUFACTURE

Africa. The Mozambique Cement Making Industry. S. African Min. & Eng. Jl., vol. 35, no. 1700, Apr. 26, 1924, pp. 877-879, 3 figs. Details of new factory of Mozambique Portland Cement Co., Ltd., at Port Matolla, Africa, and modern methods of manufacture adopted.

British Colonies and Protectorates. Cement Manufacture and Its Possibilities in the Crown Colonies and Protectorates. Imperial Inst.—Bul., vol. 22, no. 2, 1924, pp. 173-193, 3 figs. Manufacture and properties of different cements; cement-making materials of West Africa.

Cinder Cement. Cinder Cement (Kohlenaschen-Zemente), H. Luftschitz. Tonindustrie-Zeitung, vol. 48, no. 45, June 4, 1924, pp. 485-488. Discusses use of lignite and anthracite cinders in production of portland and fused cements of low lime content.

Clinker Production. Heat Economy in the Cement Industry (Aus der Wärmewirtschaft in der Zementindustrie), L. A. Bruyn. Sparwirtschaft, no. 11-12, June 1924, pp. 50-51. Discusses production of clinker and heat required for it per kg. of clinker, types of furnaces, including rotary furnaces, their construction and efficiency.

Ford Plant, Mich. How Henry Ford Makes Cement, D. F. Jennings. Concrete, vol. 24, no. 5, May 1924, pp. 65-72 (Cement Mill Sec.), 11 figs. Description of Ford cement plant, which is a unit in River Rouge plant of Ford Motor Co., and of cement manufacturing operations. First consideration at cement plant is absolute protection for human life, then plant must be absolutely dustless.

Fuel Economy. Fuel Economy in Cement Manufacture, B. Gore. Black Hills Engr., vol. 12, no. 2, Mar. 1924, pp. 77-83, 1 fig. Outlines trend of developments in fuel economy and shows opportunity for continued engineering work in this particular field.

Fuel Requirements. See KILNS, Cement.

Grinding. New Laws Govern Fine Grinding, C. E. Blyth, G. Martin and H. Tongue. Concrete, vol. 25, no. 3, Sept. 1924, pp. 42-44 (Cement Mill Sec.), 1 fig. Some general underlying laws discovered by British Portland Cement Research Assn. as result of experiments carried out during last two years. Paper read at Int. Cement Congress, Lond., and reprinted from Structural Engr. See also Cement, Mill & Quarry, vol. 25, no. 7, Oct. 5, 1924, pp. 37-38.

See also GRINDING MILLS, Ball and Pebble Mills; GRINDING, Fine, Theory of.

Kilns. See KILNS, Cement.

Lime Rock and Coal Ashes. Cement from Lime Rock and Coal Ashes. Rock Products, vol. 27, no. 23, Nov. 15, 1924, pp. 35-39, 15 figs. Methods and equipment of Security Cement & Lime Co., Hagerstown, Md.

Portland Cement. See CEMENT, PORTLAND, Manufacture; Mills.

Power Consumed by Ball Mills. Calculation of Power Consumed by Ball Mills (Note sur les calculs de la force motrice absorbée par les proyeurs à boulets), E. C. Blanc. Revue des Matériaux de Construction & de Travaux Publics, no. 174, Mar. 1924, pp. 57-60, 2 figs. Method of calculation developed by author which is sufficiently accurate for practical purposes.

Silica Cement. How Silica Cement Is Made, P. H. Jung. Chem. & Met. Eng., vol. 31, no. 12, Sept. 22, 1924, pp. 465-467, 1 fig. Discussion of problems of technology and production of an important commodity that must meet difficult industrial specifications.

CEMENT MILLS

China. The Biggest Cement Works in China, M. H. Chou. Concrete, vol. 25, no. 3, Sept. 1924, pp. 38-41 (Cement Mill Sec.), 14 figs. Brief general description of plant of Chee Hsin Cement Co., Ltd., located at Tangshan, Province of Chihle, and chemical analysis of the cement.

Dust Collection in. See DUST, Collection.

Electric Drive. Synchronous Motors for Cement Mill Drive, G. E. Cassidy. Concrete, vol. 25, no. 1, July 1924, pp. 1-7 (Cement Mill Sec.), 13 figs. See also Cement, Mill & Quarry, vol. 24, no. 12, June 20, 1924, pp. 31-33. Salient characteristics of squirrel-cage induction, wound-rotor induction, and synchronous motors, the three types of motors that may be used in cement mill; advantages and application of synchronous motors; objections raised.

See also ELECTRIC MOTORS, A. C., Synchronous.

England. A New Cement Works on the Humber. Engineer, vol. 137, nos. 3561, 3562, and 3563, Mar. 28, Apr. 4 and 11, 1924, pp. 326-328 and 336, 358-360, and 392-394, 23 figs. Layout of works of Humber Portland Cement Co.; chalk quarry and slurry plant; slurry tank and measurer and wash mills; slurry-grinding tube mills; rotary kilns; flue dust-arresting chambers; coal-handling drying and grinding plant; clinker cooling and grinding; cement storage and dispatch.

Fuel Economy. Fuel Economy in the Portland Cement Industry, Rob. W. Lesley. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 293-295. American and foreign practice; points out that future problem of cement industry is proper utilization of fuels near plant itself, whether they are bituminous shale, lignite, low-grade coals or other such materials; and it depends upon proper distillation to recover oils, ammonia, gas, etc., leaving "spent" materials, containing ideal material for cement making, to be used in industry.

Manitowoc, Wis. Up-to-Date Design at New Manitowoc Plant. Cement & Eng. News, vol. 36, no. 9, Sept. 1924, pp. 11-17, 18 figs. Gives layout and describes Wisconsin cement mill built by company's own organization.

Materials Handling in. See MATERIALS HANDLING, Cement Mills.

Mexico. Utilization of Waste Heat in Mexican Cement Plant, A. B. Stewart. Concrete, vol. 24, no. 4, Apr. 1924, pp. 49-57 (Cement Mill Section), 9 figs. General description of plant of Cia. de Cemento Portland, "La Tolteca," in state of Hidalgo, with a maximum capacity of 1800 bbl. per day, and description in greater detail of waste heat generating equipment and operating experience.

Portland-Cement. See CEMENT, PORTLAND, Mills.

Pulverized Coal, Use of. Use of Pulverized Fuel in the Cement Industry, L. N. Duryea. Nat. Engr., vol. 28, no. 6, June 1924, pp. 277-279, 5 figs. Experiences in portland cement industry point to new economies in boiler-house management. Pumping coal through pipes; accident precautions necessary in plants operated with powdered fuel; power requirements in cement industry and latest methods in utilizing waste heat.

Signal Mt., Tenn. Construction Record at Signal Mountain Plant. Concrete, vol. 24, nos. 1 and 2, Jan. and Feb. 1924, pp. 1-3 and 17-19 (Cement Mill Section), 7 figs. Describes new wet process plant of Signal Mountain Portland Cement Co., and process used; daily capacity of 3000 bbl. cement with a force of 130 men.

Sweden. The Oeland Cement Company's Plant at Degerhamn, Sweden, F. Killig. Concrete, vol. 25, no. 4, Oct. 1924, pp. 71-76 (Cement Mill Sec.), 16 figs. Description of plant and notes on methods.

CEMENT, PORTLAND

Constitution and Burning of. On the Constitution and Burning of Artificial Portland Cements, J. E. Duchez. Rock Products, vol. 27, nos. 7, 22 and 25, Apr. 5, Nov. 1, and Dec. 13, 1924, pp. 37-40, 36-38, and 24-25, 4 figs. Apr. 5: Possible reactions between alumina and lime. Nov. 1 and Dec. 13: Study of hydraulic cementing materials other than artificial cements. Translated from Revue des Matériaux de Construction.

Fine Grinding of. Researches on Theory of Fine Grinding. Cement & Eng. News, vol. 36, no. 8, Aug. 1924, pp. 21-22 and 41, 3 figs. British Portland Cement Research Assn. reports on important investigation.

High Early-Strength. High Early-Strength Portland Cements in Germany, G. Haegermann. Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924,

pp. 910-911, 1 fig. Development of standard portlands that approximate early strengths of new alumina cements.

Ideal, Characteristics of. Some Requirements in the Study of Portland Cement, T. Merriman. Eng. News-Rec., vol. 93, no. 3, July 17, 1924, pp. 105-106. Outlines fundamental considerations that need to be given extended study in connection with development of tests which will more truly disclose quality of cement than do those now available. Characteristics of "ideal cement."

Manufacture. Glass Company to Make Cement From Waste Stone. Cement, Mill & Quarry, vol. 24, no. 9, May 5, 1924, pp. 17-21, 6 figs. See also Eng. Wld., vol. 24, no. 6, June 1924, pp. 377-380, 6 figs. Pittsburgh Plate Glass Co. to begin operations in its new cement plant at its quarry site at Fultonham, Ohio, near Zanesville, to use up a by-product or waste material from its present large crushing plant. Notes on equipment and methods to be employed.

Henry Ford's Cement Plant in Operation, G. M. Earnshaw. Rock Products, vol. 27, no. 16, Aug. 9, 1924, pp. 25-31, 22 figs. Describes 1000-bbl.-per-day plant at River Rouge, Detroit, Mich., making portland cement from blast furnace slag by wet process.

Hermitage Company Prepares to Enlarge. Cement & Eng. News, vol. 36, no. 8, Aug. 1924, pp. 11-17, 17 figs. Hermitage Portland Cement Co., Nashville, Tenn., proposes to add new unit and raise capacity of plant from 2000 to 3000 bbl. per day. Discusses quarrying operation, limestone crushing, raw grinding, preparation of coal, clinker handling, etc.

Some Facts about Portland Cement Manufacture, Chas. Wadsworth, 3d. Chem. & Met. Eng., vol. 31, no. 15, Oct. 13, 1924, pp. 570-573, 5 figs. Report of inspection of Petoskey Portland Cement Co.'s plant, with special reference to peculiarities of design and operation.

Mills. New Dry Process Plant, Phoenix Portland Cement Company. Concrete, vol. 25, no. 4, Oct. 1924, pp. 60-65 (Cement Mill Sec.), 13 figs. Description of plant located near Birmingham, Ala. Raw materials; cement burning.

Shanghai Portland Cement Works. Cement, Mill & Quarry, vol. 25, no. 1, July 5, 1924, pp. 28-30, 4 figs. Plant is located on Whangpu River, 3 mi. above Kiangnan dock; power plant consists of one 2000 hp. turbine coupled with one 1440 kw., 50-cycle, 525-volt Siemens generator.

The New Wet Process Plant of the Lehigh Portland Cement Company. Concrete, vol. 25, no. 4, Oct. 1924, pp. 52-59 (Cement Mill Sec.), 16 figs. Description of plant located near Birmingham, Ala., having a total capacity of about 5000 bbl. per day.

Wisconsin's First Portland Cement Plant, C. A. Breskin. Rock Products, vol. 27, no. 18, Sept. 6, 1924, pp. 53-61, 33 figs. Describes plant and equipment of Manitowoc Portland Cement Co.; pumping of clay.

Properties. New Studies in the Properties of Portland Cement, T. Merriman. Eng. News-Rec., vol. 93, no. 17, Oct. 23, 1924, pp. 669-672, 4 figs. Solubility of cement in sugar solutions; relation between solubility and tensile strength shown to be marked and useful; effect of CO_2 on cement.

Puzzolana. Effect of Puzzolana on Cements (L'influence des pouzzolanes sur les ciments), O. Raulin. Génie Civil, vol. 85, no. 2, July 12, 1924, pp. 37-39. Discusses special portland cements and their properties; puzzolanas, including volcanic slag, trass, blast furnace slag, etc., and their properties.

Rapid-Hardening. "Ferrocrete" — A Rapid-Hardening Cement. Engineer, vol. 138, no. 3598, Dec. 12, 1924, pp. 667-668. Results of tests of beams made with new rapid-hardening cement.

Setting. Hydration Processes in the Setting of Portland Cement and Clinker (Beiträge zur Kenntnis der Hydratationsvorgänge beim Abbinden des Portlandzements und des Klinkers), H. Pulfrich and G. Linck. Kolloid-Zeit., col. 34, no. 2, Feb. 1924, pp. 117-119. By substituting mixtures of glycerine and water for plain water, authors have been able to investigate setting of portland cement under microscope, without using great excess of water hitherto thought to be necessary; best composition of clinker appears to be lime 66.7, alumina 9.7, and silica 23.6 per cent.

Solubility in Weathering Agents. Solubility of Portland Cement in Weathering Agents, H. K. Benson, J. S. Herrick and T. Matsumoto. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1063-1066, 6 figs. Solubility of anhydrous portland cement in distilled water is shown to consist largely of calcium hydroxide; solubility of hydrated portland cement is of same order of magnitude as anhydrous.

Specifications. Cement Specifications, D. A. Abrams. Concrete, vol. 25, no. 5, Nov. 1924, pp. 196-197. Comparison of French and American specifications and tests for portland cement.

Storage. Effect of Storage of Cement, D. A. Abrams. Lewis Inst., Structural Matls. Research Lab.—Bul. no. 6, Apr. 1924, 33 pp., 12 figs. Also Eng. News-Rec., vol. 92, no. 22, May 29, 1924, p. 931, and contract Rec. & Eng. Rev., vol. 38, no. 21, May 21, 1924, pp. 493-497, 4 figs. Results of tests with three different lots of portland cement stored up to five years show that increase in strength of concrete is approximately proportional to logarithm of age; also that there is appreciable loss in strength due to storage in small lots. Deterioration is due to absorption of atmospheric moisture which causes partial hydration, etc.

Tests. High-Class German and Foreign Portland Cements (Hochwertige deutsche und ausländische Portlandzemente), K. Biehl. Tonindustrie-Zeitung, vol. 48, no. 75, Sept. 17, 1924, pp. 818-820. Comparison of German and Swiss cements as to setting, mesh, tensile strength and compression.

Tests on the Practical Utilization of High-Grade Portland Cement (Versuche über die Verwertung hochwertigen Portlandzementes in der Praxis), G. Rüth. Beton u. Eisen, vol. 23, nos. 6 and 8, Mar. 20 and Apr. 20, 1924, pp. 61-63 and 89-92, 15 figs. Results of tests made on cement manufactured by Dyckerhoff & Sons, demonstrating its high-grade properties.

Utilization. Tests on the Use of High-Grade Portland Cement in Practice (Versuche über die Verwertung hochwertigen Portlandzementes in der Praxis), G. Rüth. Bauingenieur, vol. 5, no. 7, Apr. 15, 1924, pp. 193-199, 5 figs. Testing scheme; production of specimens; results of practical load tests on plates, beams and experimental floor; results of loads and other tests to determine pressure, tension, elasticity, and contraction in connection with stress and deflection coefficients; conclusions regarding possibilties for utilization of high-grade portland cement.

CEMENTATION

Iron. Cementation of Small Pieces of Iron (Ueber die Zementierung kleiner Eisenstücke), D. Uno. Kyoto Imperial Univ., College of Sci.—Memoirs, vol. 7, no. 3, Mar. 1924, pp. 107-121, 9 figs. Results of experiments show dependence of degree of cementation on temperature and time, whence from size of piece, capacity for cementation may be calculated.

Study of. Introduction to the Study of Metallic Cementation (Introduction à l'étude de la

cémentation métallique), M. H. Weiss. Revue de Métallurgie, vol. 21, no. 1, Jan. 1924, pp. 18-41, 63 figs. Principal apparatus employed. Qualitative study of phenomenon: metal couples which are very slightly miscible in solid state; metal couples forming solid solutions in all proportions. Quantitative study: Influence of temperature; development of phenomena in function of time.

C. G. S. SYSTEM. See MEASUREMENTS, C. G. S. System.

CENTRAL STATIONS

Abandoned, Idle-Equipment Utilization. Utilization of Abandoned Steam Power Plants, H. A. Woodworth. Nat. Engr., vol. 28, no. 6, June 1924, pp. 262-264, 3 figs. Constructive suggestion for making use of idle equipment at present located in the many abandoned power plants throughout the country.

Ash Handling in. See ASH HANDLING.

Aurora, Ill. Aurora Plant Addition Built in Six Months. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 463-470, 8 figs. Addition to existing plant to take over block load consists of two 6000-kw. bleeder-type turbo-generators and three 1000-hp. Stirling boilers.

Auxiliaries, Electric-Drive Developments. Developments in Electric Drive for Central Station Auxiliaries, J. W. Dodge. Gen. Elec. Rev., vol. 27, no. 6, June 1924, pp. 404-414, 16 figs. Describes the various types of motors and control for this service, and their inherent characteristics, and outlines their applications.

Auxiliary Control. Factors in Central Station Auxiliary Control, H. L. Smith. Power House, vol. 17, no. 20, Oct. 20, 1924, pp. 71-76, 1 fig. Explains importance of continuous service in steam-power-station operation. Considers each auxiliary separately insofar as types of drive are concerned.

Boiler-Feedwater Circuits. Boiler Feed-Water Circuits in Power Stations, J. G. Weir. Ingenieur, vol. 39, no. 18, May 3, 1924, pp. 332-338 and (discussion) 338-339, 18 figs. Importance of use of regenerative principles is emphasized and a number of possible circuits are described, illustrated and analyzed. (In English.)

Bridgeport, Conn. Steel Point Station at Bridgeport, W. F. Thompson. Power, vol. 59, no. 7, Feb. 12, 1924, pp. 238-244, 5 figs. Simplicity and accessibility are outstanding features of new plant of United Illuminating Co.

Brooklyn Edison, Hudson Ave. Hudson Avenue Station. Elec. World, vol. 83, no. 18, May 3, 1924, pp. 867-876, 13 figs. Unusual features incorporated in design of new 400,000-kw. power house of Brooklyn Edison Co.; vertical-phase isolation used; details of coal-handling facilities, heat-balance arrangements, boilers and stokers, fans and feed pumps, turbines (which are largest in world), signaling system, etc. See also descriptions in Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 549-553, 12 figs.; and in Power, vol. 59, no. 20, May 13, 1924, pp. 750-758, 14 figs.

See also Heat Balance.

Calcutta, India. The Calcutta Electricity Supply Undertaking, W. Twinch. Elec. Rev., vol. 94, no. 2422, Apr. 25, 1924, pp. 659-663, 10 figs. Description of Cossipore electricity generating station; present output is 57,500 kw., and pressure of generation is 6000 volts.

Chicago, Ill. Calumet and Crawford Ave. Stations of the Commonwealth Edison Co., Chicago, Ill., W. F. Sims. Iron & Steel Engr., vol. 1, no. 7, July 1924, pp. 382-386, 5 figs. General layout, coal-handling equipment, boiler plant, feedwater system, switchhouse, connection with other stations.

Coal Handling in. See COAL HANDLING, Power Plants.

Combustion Control, Centralized. Centralized Combustion Control in Lowellville, Jos. F. Shadgen. Power, vol. 59, no. 18, Apr. 29, 1924, pp. 676-679, 2 figs. One of first complete remote-machine-regulated combustion systems in large power plants; fuel efficiency main object; pneumatic dispatch system of master controller and individual regulators; novel central-control house with unique instrument board.

Comines, France. Central Power Station at Comines, J. Gould Coutant. Combustion, vol. 11, no. 4, Oct. 1924, pp. 276-278, 4 figs. Initial installation consists of three 25,000-kw. turbo-generators, served by 10 boilers; details of pulverized-coal equipment; results of pulverized-coal firing have warranted placing of fourth repeat order for apparatus for extensions to station.

Construction Methods. Construction Procedure for a Steam Power Station. Eng. News-Rec., vol. 92, no. 18, May 1, 1924, pp. 754-757, 7 figs. Connecticut Light & Power completes 75,000-kva. unit at Devon; concreting continued through winter; many parts fabricated in field shops.

Control. Automatic Control of Small Central Stations by Means of Mes Regulators (La regolazione automatica delle piccole centrali elettriche col regolatore rapido sistema "Mes"), G. Picker. Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 660-664, 13 figs. Details of design and operation of apparatus for d.c. and for a.c. control.

Distribution of Output of High-Tension Plants Working in Parallel (Die Leistungsverteilung beim Parallelbetrieb in Hochspannungsanlagen), J. Becker. Elektro-Journal, vol. 4, no. 10, Oct. 1924, pp. 278-280, 4 figs. Describes Zipp apparatus, by means of which all operating conditions in lines and power stations can be controlled effectively and with ease.

Crawfordsville, Ind. New Crawfordsville Unit Shows High Economy. Power Plant Eng., vol. 28, no. 22, Nov. 15, 1924, pp. 1128-1133, 11 figs. Municipally owned public service plant in Indiana installs new 3000-kw. turbo-generator which shows steam consumption of less than 15 lb. per kw.-hr.; coal consumption is considerably reduced; boiler tests and method of testing.

Design. Some Considerations in Power Station Design, F. W. Lawton. Jr. Instn. Engrs., vol. 35, part 1, Oct. 1924, pp. 1-17, 4 figs. Leading factors which contribute to economical design and operation of large central generating stations employing steam turbine as prime mover.

Design and Maintenance. Design and Maintenance of a 7500 Kw. Central Station Plant. Nat. Elec. Light Assn.—Serial Report of Prime Movers Committee, Sept. 1924, 13 pp., 20 figs. Includes also manufacturers' statements.

Design and Operating Cost. Power Plant Design and Operating Cost. Power Plant Eng., vol. 28, nos. 7, 8, and 9, Apr. 1, 15, and May 1, 1924, pp. 372-374, 432-433, and 480-482, 10 figs. Apr. 1.: Comparison of costs which enter into design and maintenance when various types of prime movers are used. Apr. 15: Investment and operating costs of 1500-kw. central-station non-condensing plant with superheat. May 1: Investment and operating costs of 1500-kw. central station non-condensing plant with saturated steam.

Despatching Board. System Operating and Dispatching Board, A. P. Broadhead. Elec. World, vol. 83, no. 13, Mar. 29, 1924, pp. 627-628, 1 fig. Control board used by N. Y. State Gas & Elec. Corpn. to aid despatchers in checking operations on entire system, and also to give at all times indication of condition of equipment.

Detroit Edison Co. New Station for Detroit Edison Co., A. K. Bak and R. B. Purdy. Power Plant Eng., vol. 28, no. 11, June 1, 1924, pp. 579-585, 10 figs. New Trenton Channel plant on Slocum's Island embodies new features such as pulverized coal, stage feedwater heating, outdoor switching station and d.c. generators for driving station auxiliaries, making source of auxiliary energy absolutely independent of main system; summary of mechanical equipment. See also description by P. W. Thompson in Elec. World, vol. 83, no. 22, May 31, 1924, pp. 1118-1128, 14 figs.; and description by C. H. Berry in Power, vol. 59, no. 22, May 27, 1924, pp. 848-857, 6 figs.

Developments. Development and Progress of Central Station Engineering, B. Sankey. S. African Inst. Elec. Engrs.—Trans., vol. 15, pt. 2, Feb. 1924, pp. 326-334 and (discussion) 334-338, 3 figs. Latest developments in steam-power generation, including high temperatures, high pressures, and air heating, binary fluid turbines, Mulungushi hydroelectric scheme, etc.

Résumé of the Year's Progress in Power Station Work. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 840-857, 3 figs. Report of A. I. E. E. Power Stations Committee reviewing power station progress. Deals with switches and circuit-breakers, development in water-wheel-type generators, flywheel effect of a.c. waterwheel generators, temperature standards, electric drive and control of auxiliaries, alternating versus direct current, power supply, motors and control, terminal rooms, bus structures, turbo-generator units, ventilation, lightning arresters, transformers, automatic equipment, etc.

Devon Station, Conn. Devon Station Marks Forward Step in Development of New England Superpower. Elec. World, vol. 83, no. 12, Mar. 22, 1924, pp. 562-570, 12 figs. New base-load, high-tension plant of Conn. Light & Power Co. designed for 200,000-kva. rating; mechanical and electrical features.

Devon Station of the Connecticut Light & Power Company. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 474-480, 10 figs. Located near mouth of Housatonic River, and has been laid out for a possible ultimate capacity of 200,000 kva. and 16 boilers. Present installation consists of three 25,000-kva. units and six 16,800-sq. ft. boilers.

See also Construction Methods; Heat Balance.

Diesel-Engined. Converting a Loser into Profit-Making Plant. Power, vol. 59, no. 20, May 13, 1924, pp. 772-775, 6 figs. Central station at Caruthersville, Mo., supplying both electricity and ice, cut its generating cost from over 6 to less than 1 per cent per kw-hr. by replacing an obsolete steam plant with Diesel engines; waste-heat recovery is employed in nearby house-heating service.

Diesel Engine Operating Experience, J. A. Boggs. Elec. World, vol. 84, no. 19, Nov. 8, 1924, pp. 995-998, 5 figs. How installation of two 550-hp. units of type named saved Neodesha, Kan., $18,624 in 10 months; analysis of operating results; details of installation.

Diesel Engines Eliminate Losses in Carthage Light Plant. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 684-686, 3 figs. By installation of Diesel engines production costs were reduced to below 1 per cent per kw-hr.

Diesel Engines for Standby Service in Steam and Hydro Plants, E. B. Pollister. Elec. Light & Power, vol. 2, no. 2, Feb. 1924, pp. 24-26 and 68, 9 figs. Ideal characteristics of a standby and auxiliary prime mover; data on recent installations.

Ice Control Methods at Shelburne Falls, J. H. Kennedy. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 895-896, 5 figs. Constant work is required to keep channels open and units running up to capacity on Deerfield River in Massachusetts at plants of New England Power Co. Abstract of article in Contact, May 1924.

Operating a Diesel Power Plant, R. G. Melrose. Power, vol. 60, no. 9, Aug. 26, 1924, pp. 324-325. Outline of principal sources of operating difficulties experienced with oil engines, together with remedies.

Systematic Methods for Oil Engine Plants. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 893-894, 2 figs. Prime Movers Committee of Nat. Elec. Light Assn. stresses value of definite maintenance procedure and record systems.

The New Diesel-Electric Central of the French Concession in Shanghai (La nouvelle centrale électrique à moteurs Diesel de la Concession française de Shanghai). Génie Civil, vol. 85, no. 26, Dec. 27, 1924, pp. 599-603, 11 figs. Details of new power station of French Tramway & Electric Light Company, consisting of two 1200-kva. groups of Diesel-Sulzer engines and Oerlikon alternator and two 3300-kva. groups of Diesel-Sulzer engines and Schneider alternator, one of latter to be installed in 1925.

See also Iron River, Mich.; Rural, France; DIESEL ENGINES, Central-Station.

Diesel Power vs. Steam. Diesel Power vs. Steam for Large Central Stations. Oil Engine Power, vol. 2, no. 12, Dec. 1924, pp. 644-666, 3 figs. Claims that argument that mammoth units are necessary for central-station work is based solely on extreme wastefulness of smaller steam units and not on any essential requirement of central-station work; moreover, reduced water rate of large steam unit is largely counterbalanced by excessive complication of accessories required to make its low water rate a reality; how this affects question of using Diesel power is elucidated.

Electric Heating, Sale of Current for. Increasing Efficiency of Power Plants through Sale of Current for Electric Heating (Erhöhung der Leistungsfähigkeit der Kraftwerke durch Abgabe von Heizstrom), W. Windel. Elektrotechnische Zeit., special spring no., 1924, pp. 19-21, 2 figs. Shows how operating costs can be reduced by sale of current for electric heating; calculation of net costs of current generation for one kw-hr.; calculation of cost of generating heat.

Electric Trucks. "Electrics" in Central-Station Service. Elec. Wld., vol. 84, no. 8, Aug. 23, 1924, pp. 365-367, 2 figs. Definite field of activity indicated. Little serious study has been given by central stations to allocation of their own transportation vehicles, and survey shows electric trucks have been neglected.

Electrical Design. Progress Evident in Station Electrical Design, R. E. Argersinger. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1204-1207, 3 figs. Summary of developments in electrical design as shown by large stations now nearing completion.

Electrical Equipment. American Power Station Electrical Equipment, B. G. Lamme. Engineering, vol. 118, no. 3055, July 18, 1924, pp. 108-110. Describes turbo-generators, a.c. water-wheel generators, synchronous condensers, frequency changer sets, transformers, reactors, switchboard practice for power houses, etc. Paper, abridged, contributed to World Power Conference.

Some Engineering Achievements of 1923, H. W. Cope and J. Liston. Southern Engr., vol. 40, no. 6, Feb. 1924, pp. 56-61, 9 figs. Description of a few of the larger power-plant apparatus, especially along electrical lines.

Employment Management in. See EMPLOYMENT MANAGEMENT, Central Station.

Esthonia. The Transcontinental Power Works at Ullila in Esthonia (Das Ueberlandwerk Ullila in Estland), A. Thomson. Elektrotechnische Zeit., vol. 45, no. 36, Sept. 4, 1924, pp. 956-959, 1 fig. Discusses utilization of peat deposits in Esthonia for power production; details of boiler plant, machinery, and switching plant.

Europe. Central Station Practice in Europe, B. G. Jamieson. West. Soc. Engrs.—Jl., vol. 29, no. 6, June 1924, pp. 247-256, 5 figs. Some noticeable differences in electrical engineering practice including use of mercury-arc rectifiers in place of converters, high voltage direct current and lack of interconnection of networks, extensive use of underground cable. Attention is given to appearance of central-station buildings and surroundings.

Fort Dodge, Ia. New Plant at Fort Dodge Shows High Economy. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 676-681, 10 figs. Plant of 5000-kw. cap. using steam at 550 deg. fahr., shows boiler-room economy of 85 per cent.; equipped with economizers, two-effect evaporator system with bleeding from main units, underfeed stokers, two induced-draft fans per boiler and motor drive for auxiliaries; simple coal-handling installation. Summary of equipment.

France. Electric Plants of the La Houve Mines (Les installations électriques des mines de La Houve), J. Reyval. Revue Générale de l'Electricité, vol. 16, no. 18, Nov. 1, 1924, pp. 703-713, 14 figs. Describes 650,000-volt central station and distributing system, linking up with main lines of eastern France and Switzerland.

Germany. Development of Public Electricity Industry on the Basis of Lignite Deposits in Central Germany (Der Aufbau der öffentlichen Elektrizitätswirtschaft auf der Braunkohle Mitteldeutschlands), M. Jahncke. Also Elektrotechnische Zeit., vol. 45, nos. 34 and 35, Aug. 21 and 28, 1924, pp. 909-913, and 928-934, 28 figs. Braunkohle, vol. 23, no. 18, Aug. 2, 1924, pp. 309-319, 11 figs. Statistical review of lignite power development, quantities and qualities of lignites available, linking up of works, advantages of large scale works, high tension lines, etc.

Electricity Supply of Schleswig-Holstein and West-Mecklenburg (Die Elektrizitätsversorgung Schleswig-Holsteins und West-Mecklenburgs), G. Scheehl. Elektrotechnische Zeit., vol. 45, no. 29, July 17, 1924, pp. 771-774, 1 fig. Details of power stations at Flensburg, Rendsburg, Kiel, Altona, Hamburg, Lübeck, their equipment, connections, etc.

Thüringen Works (Das Thüringenwerk), A. Schönberg. Elektrotechnische Zeit., vol. 45, no. 23, June 5, 1924, pp. 577-579, 2 figs. Details of combined electricity works supplying whole of state of Thüringen.

Heat Balance. Heat Balance at Hudson Avenue Station (Brooklyn), Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 706-709, 3 figs. Six sources of heat are involved in cycle; control is automatic; vertical isolation of phases is feature of electrical design.

Heat Balance in Devon Station. Power, vol. 59, no. 18, Apr. 29, 1924, pp. 674-675, 2 figs. Heat cycle designed for steam plant that operates in parallel with hydroelectric stations.

Heat Balance Study, F. H. Rosencrants. Combustion, vol. 11, no. 4, Oct. 1924, pp. 278-283, 2 figs. Analysis of relative merits of various means adopted for reducing loss of heat to condenser and to stack. (Abstract.) Report of Prime Movers Committee of Nat. Elec. Light Assn.

High Pressures and Temperatures in. High Pressures and High Temperatures in Central Stations, W. S. Monroe. Power, vol. 60, no. 3, July 15, 1924, pp. 87-91, 6 figs. Discusses reheating and regenerative cycles, describes arrangement employed at Crawford Ave. Station and shows why initial cost with 550 or 600 lb. need be but little more than with 300 lb. pressure. From paper read before World Power Conference.

Holland. Electrification of Holland (L'Électrification des Pays-Bas), H. Claus. Vie Technique & Industrielle, vol. 5, no. 46, July 1923, pp. 229-232. Summary of report by high voltage commission regarding linking up of power stations and its advantages.

Indiana. Rehabilitation of Two Indiana Plants Increases Efficiency. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 834-842, 12 figs. Central stations at Kokomo and Logansport have been made part of Northern Indiana Power Co. system, permitting them to exchange power back and forth with other plants in this system.

Industrial Power Plants vs. Central Station vs. Industrial Power Plants, W. J. Risley, Jr. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 896-897. Factors to be considered in making a change from one form of service to other.

Inspection. Periodic Power-Plant Inspection. Power, vol. 59, no. 11, Mar. 11, 1924, pp. 404-405. List of general instructions issued by Fed. Light & Traction Co., New York City, to managers of their subsidiary companies.

Interconnection. A New England Interconnection, R. J. Andrus. Elec. World, vol. 83, no. 3, Jan. 19, 1924, pp. 127-130, 7 figs. Principal features of stundy undertaken in connection with decision of Twin State Gas & Elec. Co. to interconnection St. Johnsbury (Vt.) division with Berlin (N. H.) division by a transmission line 52 miles long to provide additional capacity; saved building a steam-plant addition.

Interconnection of Electrical Systems. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 949-952, 2 figs. Discusses possible distances of transmissions in future, high-tension distribution networks, present-day transmission problems, and one-million-volt line. States that scheme of interconnection which will fully utilize hydraulic resources will undoubtedly show greatest economy.

Interconnection, Super-Power and Electrification, S. Q. Hayes. Elec. Jl., vol. 21, nos. 2, 3, 4, and 5, Feb., Mar., Apr., and May, 1924, pp. 72-77, 118-120, 166-176, and 247-254, 31 figs. General descriptive definitions of interconnection, superpower and electrification; benefits arising from their use; typical examples, both domesitc and foreign; and general conclusions as to advantages to be gained by properly combining these developments.

Super-Power Plants and Systems. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 1-8, 19 figs. Whereby economies in distribution of electrical energy may be obtained through interconnection of electrical systems.

The Steel Industry and the Electric Utilities, M. Skinner and F. D. Mahoney. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 532-536, 3 figs. Discusses advantages of interconnection between electric power systems of larger steel companies and those of neighboring electric utility companies, and difficulties to be overcome.

Iron River, Mich. Diesel-Engine Stand-by Plant at Iron River, Michigan. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 390-393, 3 figs. Describes a two-unit Diesel plant of 2150 kva. capacity installed to supplement water power in preference to addition to existing steam plant; cost $187.74 per kilowatt; economy 0.675 lb. oil per kilowatt-hour.

Kearny Plant, N. J. Work on Kearny Plant Progressing. Power Plant Eng., vol. 28, no. 5, Mar. 1, 1924, pp. 310-311, 2 figs. Additional details concerning plant on Hackensack River,

N. J., being built by Pub. Service Elec. Power Co., which will add new link to chain of superpower stations in East.

Large. The Economics of German Electricity Supply (Grundsätzliches zur deutschen Elektrizitätswirtschaft), G. Klingenberg. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 45, Nov. 8, 1924, pp. 1169-1170. Traces stages of centralization; points out that large central stations with comparatively low installation costs and technically and economically good operation are limited by high transmission costs; interconnection and extension of power plants through district federations; national coöperation only in the case of a few very large undertakings, especially hydroelectric and lignite works.

Leicester, England. The New Leicester Central Generating Station, T. R. Smith. Instn. Elec. Engrs.—Jl., vol. 63, no. 336, Dec. 1924, pp. 29-34, 3 figs. General description of work in hand or completed; particulars of general performance of that portion of plant which is in operation; discussion of lines on which future development of station may take place.

Lighting. See LIGHTING, Central Stations.

Lignite Firing. High Power Furnaces and Their Introduction into Power Works (Hochleistungsfeuerungen auf der ersten rheinischen Braunkohlenmesse und ihre Einführung in die Kraftwerke), Grunewald. Feuerungstechnik, vol. 12, no. 24, Sept. 15, 1924, pp. 197-203, 13 figs. Development of electric power plants burning lignite; high power grates for new boiler units; pulverized coal addition; stoking arrangements.

Load Dispatching. Load Dispatching—Directing the Operation of Large Central Station Systems, P. B. Juhnke. Elec. Light & Power, vol. 2, no. 2, Feb. 1924, pp. 13-17, 68-71 and 78, 3 figs. Relation of load dispatcher with generating stations; with transmission system, with substations and with distribution system; carrying capacity of cables; load dispatcher's diagram.

Station Readings Brought to Dispatcher, R. Bailey. Elec. Wld., vol. 84,. no. 5, Aug. 2, 1924, pp. 215-218, 4 figs. Records of loads at three generating stations are transferred over telephone lines to indicating and recording equipment in load dispatcher's office, Philadelphia, Pa., by simple accurate method.

London Electricity District. The North Metropolitan Electric Power Supply Company's Undertaking. Elec. Rev., vol. 94, nos. 2406 and 2407, Jan. 4 and 11, 1924, pp. 19-23 and 59-61, 19 figs. Describes additions and improvements which have been made to original installation at Brimsdown.

Management in. See INDUSTRIAL MANAGEMENT, Central Stations.

Manchester, England. The Barton Power-Station of the Manchester Corporation, and the Transmission-System in Connection therewith, H. N. Alliott and S. L. Pearce. Instn. Civ. Engrs.—Sessional Notices, no. 3, Feb. 1924, pp. 62-64. Site can accommodate 165,000 kw. of plant, whereof first section consists of 82,500 kw.; details of station equipment. (Abstract.)

Miami Fort, Ohio. High-Pressure Station on Ohio. Elec. World, vol. 84, no. 25, Dec. 20, 1924, pp. 1304-1306, 2 figs. See also Power, vol. 60, no. 27, Dec. 30, 1924, pp. 1067-1068. Miami Fort plant built for turbine water rate of 7.67 lb. per kw.-hr., using 600-lb. pressure and two 40,000-kw. tandem turbines tapped at four points; important features are use of pulverized fuel, air preheaters, and unique boiler-room equipment.

Mine-Mouth Plant. See Wabash River Plant, Indiana.

Mine-Operated. This Mine Power Plant Produces Power Cheaply, C. L. Moorman. Coal Age, vol. 25, no. 6, Feb. 7, 1924, pp. 210-212, 4 figs. Tests show cost to be 0.43 cents per kw-hr. under full-load conditions, 1.09 cents on idle days; stokers feed crushed refuse with washed slack; plant near Staunton, Ill., supplies power to three mines of Consolidated Coal Co. of St. Louis.

Motor-Truck Transportation. "Gas" Trucks in Central-Station Service. Elec. World, vol. 83, no. 15, Apr. 12, 1924, pp. 721-724, 5 figs. Survey of representative practices in all parts of United States; trend toward standaridzation; data on costs, performances, types and uses.

Muscatine, Iowa. Municipal Service for Muscatine. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 984-990, 9 figs. Describes municipally-owned electric light plant recently put into operation at Muscatine, Ia., which will furnish electricity for public service in competition with existing public service company and in addition will handle all street lighting and pumping requirements of this industrial city of 17,000 inhabitants.

Muskogee, Okla. New Byllesby Plant Near Muskogee. Power, vol. 60, no. 15, Oct. 7, 1924, pp. 562-568, 8 figs. Equipped to burn coal or oil and has a complete system for clarifying and softening muddy river water and is designed to safeguard operation from fluctuations of 40 ft. in river level.

North Tees Station, England. The North Tees Power Station. Engineering, vol. 117, no. 3050, and vol. 118, no. 3054, June 13 and July 11, 1924, pp. 753-755 and 57-59, 14 figs. partly on supp. plate. See also Engineer, vol. 137, no. 3572, June 13, 1924, pp. 664-665, 4 figs. General description of power station of North-Eastern Power Cos., with particulars of its layout and equipment; design from thermodynamic point of view.

The North Tees Power Station. Elec. Rev., vol. 95, no. 2432, July 4, 1924, pp. 18-22, 8 figs. Describes equipment of North Tees Station, unit of Northeastern Power Co.; boiler arrangement; 20,000 kw. turbo-generators, by Metropolitan-Vickers.

Oil-and-Coal-Fired. Station Fired with Oil and Coal, E. J. Burger. Elec. World, vol. 84, no. 20, Nov. 15, 1924, pp. 1039-1043, 9 figs. Features in design of 8000-kw. plant for Sedalia, Mo.; details of installation; operating methods.

Oil Burning in. See OIL FUEL, Burning.

Operating, Costs. How to Analyze the Operating Costs in a Municipal Electric System, G. F. Drewry. Elec. News, vol. 33, nos. 13 and 14, July 1 and 15, 1924, pp. 54-55 and 55-56. Advantages of cost analysis; cost of power can be definitely distributed; power factor must be taken into account.

See also Design.

Output and Distribution, N. America. Fourteen Systems with Output of More than a Billion Kilowatt-Hours in 1923. Elec. World, vol. 83, no. 15, Apr. 12, 1924, pp. 715-719. Tabular data on output and peak load of largest generating and distributing companies in United States and Canada; 1923 detailed output and distribution data for North American systems.

Parsons Line. Some Opinions on the "Parsons Line." Power Engr., vol. 19, no. 220, July 1924, pp. 251-253, 4 figs. Number of expressions by station engineers regarding value of this method of checking operating results.

Peoria, Ill. New Station Under Construction at Peoria, Illinois. Power, vol. 59, no. 17, Apr. 22, 1924, pp. 630-633, 3 figs. Initial section of 5-unit plant consisting of two 20,000-kw. turbo-generators, each served by two 13,920-sq. ft. boilers burning pulverized coal, designed for 400-lb. pressure and 250-deg. superheat; closed feed-

water system with automatic deaëration of water; other features.

Philadelphia. Operating Features at Delaware. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 537-542, 8 figs. Among interesting features of large central station in Philadelphia are test boilers, emergency valve control, and dual-drive circulating pumps.

Pineville, Ky. Pineville, Ky., New Steam Plant. South Engr., vol. 41, no. 8, Oct. 1924, pp. 35-41, 11 figs. Description of new $3,500,000 steam generating station of Ky. Utilities Co.; present capacity 15,000 kw.; bleeder turbine in one unit; ultimate capacity 30,000 kw.; Stirling water-tube boilers 10,012 sq. ft. heating surface.

Pittsburgh District, Power Production. Electric Power in Pittsburgh District, W. F. Rittman and S. B. Ely. Elec. World, vol. 83, no. 25, June 21, 1924, pp. 1271-1276, 13 figs. Analysis of central-station power production over period of years; detailed data on division of load, outputs, peak demands, and future trends; comparison with other power sources.

Plant Costs. See Saginaw River, Mich.; Unit Costs.

Power Factor, Improving. See POWER FACTOR, Improvement.

Power Supply. Power Supply for Central Station Auxiliaries, J. W. Dodge. Power House, vol. 17, no. 17, Sept. 5, 1924, pp. 21-25, 5 figs. Discusses radical changes in design and operation of large steam plants as direct result of high fuel costs; electric-drive economy; supply from main units, coupled to main unit, direct-current machine, etc.

Practice. General Review of Current Practice, P. Junkersfeld and G. A. Orrok. Combustion, vol. 11, no. 2, Aug. 1924, pp. 125-129, 3 figs. Current practice in power-plant field reviewed with particular reference to central stations. Compact chart indicating equipment in 22 of the most modern plants in United States.

Private Plant, vs. Central-Station Power Versus the Private Plant, H. C. Thuerk. Elec. World, vol. 83, no. 22, May 31, 1924, pp. 1140-1141. Disadvantages of isolated plant which are sometimes overlooked in comparing relative merits of two sources of power.

Problems. A Solution of Three Serious Central Station Problems, W. A. Layman. Rose Technic, vol. 33, no. 4, Jan. 1924, pp. 3-6 and 24-25, 3 figs. Discusses idle investment, excess system losses, and poor regulation.

Producer-Gas-Engined. The Salisbury Producer Gas Engine Electric Plant. S. African Power Engr., vol. 9, no. 79, Nov. 1924, pp. 3-7, 6 figs. Describes new municipal producer-gas engine plant erected at Salisbury, S. Africa. Saving of 75 per cent in fuel costs; big increase in overall thermal efficiency.

Pulverized-Coal-Burning. Pulverized Fuel at the Cleveland Electric Illuminating Company's Lake Shore Plant, W. H. Aldrich. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 519-520 and (discussion) 520-522 and 545. Data on pulverized-fuel equipment at this plant and experience gained in operation; description of coal-handling and burning apparatus.

Thiers Central Station Fired with Pulverized Coal (Station centrale de Thiers chauffée au charbon pulvérisé), M. L. Champy. Annales des Mines, vol. 5, no. 5, May 1924, pp. 291-317, 3 figs. Storing, drying, and conveying of pulverized coal; combustion chamber, boilers, turbo-alternators, switching facilities, and tests made; plant was particularly constructed to use a fuel which was otherwise useless because it was too fine.

Reheating in. Reheating in Central Stations, W. J. Wohlenberg. Mech. Eng., vol. 46, no. 5, May 1924, pp. 259-262, 11 figs. Influence of amounts of energy added in reheating, number of reheating stages and points in expansion at which reheating should begin; comparison of reheating, regenerative, and combination cycles combining both reheating and bleeding stages; shows that, because of influence on internal machine efficiency thereby, reheating properly applied may lead to higher efficiencies than bleeding; also that combination cycles give promise of realization in practice of appreciably higher efficiencies than would be the case for other cycles investigated. (Abridged.)

Remodeling. Modern Equipment Reduces Cost of Power. Power, vol. 60, no. 6, Aug. 5, 1924, pp. 210-211, 2 figs. Steam equipment of Abeville, La., municipal light plant replaced by Diesels; cost of generating current reduced; water works served by motor-driven centrifugal pumps and air lift.

Revamping Municipal Electric Plant at Hannibal, Mo. Power, vol. 59, no. 11, Mar. 11, 1924, pp. 394-397, 4 figs. Revamping a Corliss-engine condensing plant and installing additional boiler, new turbo-generator to carry bulk of load, and coal and ash-handling equipment, resulted in reducing steam consumption per unit of output 40 per cent, amount of coal burned in nearly same proportion, and 24-per cent reduction in labor costs.

Remote Control, Supervisory Systems for. Supervisory Systems for Remote Control, J. C. Field. Elec. Communication, vol. 3, no. 2, Oct. 1924, pp. 134-144, 16 figs. Three types developed to meet three different operating conditions.

Rural, France. Using Heavy Oil-Engines for Rural Electrification (L'utilisation des moteurs à huile lourde pour l'électrification des campagnes), Y. LeGallou. Revue Générale de l'Électricité, vol. 16, no. 4, July 26, 1924, pp. 147-158, 7 figs. Recommends construction of small and medium centrals with heavy-oil engines for driving generating groups, as is done in Denmark.

Russia. Work of the Electric Stations of the Moscow Region in 1922, S. P. Stafrin. Electritchestvo, no. 1, Jan. 1924, pp. 31-41, 3 figs. Statistical article based on data collected by commission for investigation of trusts. (In Russian.)

Saginaw River, Mich. Saginaw River Steam Plant Costs Explained, H. F. Eddy. Power, vol. 60, no. 16, Oct. 14, 1924, pp. 615-616. Author explains cause of exceptionally low cost—$71 per kw. of rated capacity. (Abstract.) Paper before Nat. Elec. Light Assn.

Saginaw River Steam Plant of Consumers Power Company. Power, vol. 60, no. 4, July 22, 1924, pp. 122-129, 7 figs. This new steam generating station has recently put in operation an initial 40,000-kw. installation of a 100,000-kw. plant, featured by preheating of feedwater and combustion air with steam bled from three stages of main turbines, conservation of radiated and blow-off heat, water sides in boiler furnaces, sluicing of ashes, and two motor-driven fans. Table giving data on principal equipment.

St. Louis, Mo. Cahokia—A Masterpiece, F. J. Crolius. Blast Furnace & Steel Plant, vol. 12, no. 4, Apr. 1924, pp. 7-11, 6 figs. Superpower plant at St. Louis constitutes study in material handling; summary of principal equipment.

Cahokia Station, Union Electric Light & Power Company, St. Louis, Mo. Power, vol. 59, no. 14, Apr. 1, 1924, pp. 514-524, 15 figs. Uses pulverized fuel; preparation plant in same building as boilers and flue gases utilized to dry coal; each section of station containing 2 turbo-generators and 8 boilers is independent unit; steam pressure 300 lb., temperature 690 deg., natural draft, no economizers.

Pulverized-Fuel, Isolated-Phase Station. Elec. World, vol. 83, nos. 13 and 14, Mar. 29 and Apr. 5, 1924, pp. 610-620 and 659-666, 31 figs. See also description in Power Plant Eng., vol. 28, no. 7, Apr. 1, 1924, pp. 365-371 and 397-401, 10 figs. Features of Cahokia power plant, St. Louis, which involves underground coal-handling facilities, coal-preparation plant integral with station, unit layout of station and unusual condenser-floor and foundation plans.

St. Pancras, London. Extensions at St. Pancras. Elec. Times, vol. 66, no. 1725, Nov. 6, 1924, pp. 531-533, 5 figs. See also Elecn., vol. 93, no. 2425, Nov. 7, 1924, p. 527, 1 fig. Pulverized fuel, radiant heat superheaters, water-cooled furnace walls and other progressive features at St. Pancras (London) generating plant; describes installation of latest 7000-kw. Brush-Ljungström turbo-generator set.

St. Paul, Minn. Completing High Bridge Plant at St. Paul. Elec. World, vol. 84, no. 26, Dec. 27, 1924, pp. 1347-1349, 6 figs. Details of two-unit section of generating station of Northern States Power Co. which will serve at base-load plant to supplement nearby water powers.

High Bridge Steam Plant at St. Paul. Power, vol. 60, no. 26, Dec. 23, 1924, pp. 1006-1013, 8 figs. Initial 60,000-kw. installation of big base-load steam plant to supply St. Paul and surrounding territory and supplement water power of Northern States Power Co.; equipped with underfeed stokers, two-stage bleeding and evaporators used to purify water.

Saxton, Pa. Saxton Plant of the Penn Central Light & Power Company, A. Iddles. Power, vol. 59, no. 16, Apr. 15, 1924, pp. 592-599, 11 figs. Minemouth station designed for ultimate capacity of 100,000 kw.; first section, of 20,000 kw., installed; boilers equipped with economizers; house turbine and low-pressure evaporators; load on house turbine automatically controlled by temperature of boiler feedwater; data on principal equipment.

Service Improvement. Improving Central Station Service by the Application of Current-limiting Reactors to Distribution Feeders, D. K. Blake. Gen. Elec. Rev., vol. 27, no. 6, June 1924, pp. 361-368, 17 figs. Decided advantages that are obtainable by installation of current-limiting reactors in distribution feeders.

South Africa. Natal Electrification: Its History and Advantages. So. African Power Engr., vol. 9, no. 75, July 1924, pp. 26-28, 3 figs. Discusses why Maritzburg-Glencoe section was chosen; cost of scheme; estimated savings to be effected; other advantages anticipated; by-products and cheap power for local industries.

The Colenso Power Station. So. African Power Engr., vol. 9, no. 75, July 1924, pp. 29-34, 6 figs. Design and construction of power station to supply Maritzburg-Glencoe electrification section of S. A. R.

The Control Organisation of the Victoria Falls and Transvaal Power Co., Ltd., E. F. Rendell. S. African Inst. Elec. Engrs.—Trans., vol. 15, Pt. 9, Sept. 1924, pp. 446-471, 13 figs. Layout of system, general organisation, control office, arrangement of telephones, instruments, operation regulations, loading, operation of air distribution system, sectionalization and protection, communication system, and emergency operating.

The New Witbank Power Station. So. African Power Engr., vol. 9, no. 76, Aug. 1924, pp. 14-16, 1 fig. General layout and design of station with cooling ponds, coal staithes, outdoor switch house; five 20,000 kw. generators are to be installed; boiler house to contain 20 B. & W. boilers.

The Power Station Extensions at Kingwilliamstown. So. African Power Engr., vol. 9, no. 78, Oct. 1924, pp. 3-5, 2 figs. Describes new station to be erected, giving details of boiler house and engine-room plant and layout of power station.

The Randfontein Power Station. So. African Power Engr., vol. 9, no. 76, Aug. 1924, pp. 24-25, 1 fig. Description of largest single mine power station in So. Africa; 20,000 kw. capacity; general scheme and various features described.

The Rand's Largest Central Power Station. So. African Power Engr., vol. 9, no. 76, Aug. 1924, pp. 27-29. Describes Rosherville station; auxiliary machinery; electric generating and air compressing.

The Steam Plant of the Pretoria Power Station. S. African Power Engr., vol. 9, no. 77, Sept. 1924, pp. 24-26, 3 figs. Particulars of boiler plant, steam range and feed pumps, coal and ash-handling equipment, flue arrangements, draft system, turbines and condensing plant.

Southampton, England. Developments at Southampton, W. G. Turner. Electrician, vol. 93, no. 2411, Aug. 1, 1924, pp. 130-131, 1 fig. Details of extension of power station and area of supply, new 5000- and 6000-kw. turbo-generators.

State vs. Private Ownership. State versus Private Ownership of Electrical Utilities, A. T. Hadley. Nat. Elec. Light Assn.—Bul., vol. 11, no. 10, Oct. 1924, pp. 613-617. After dispassionate review of subject from standpoint of student of political economy, author is of opinion that as electrical industries constitute a field where there is exceptional room for progress in immediate future, both on operating and on commercial side, it seems most undesirable that electric power generation should become a government monopoly. From paper before World Power Conference, London.

Steam-Turbine, Developments in. Modern Tendencies in Steam-Turbine Power Plants, E. Berg and F. V. Smith. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 577-582, 10 figs. High pressure, superheat, reheating, and steam extraction as affecting power-plant economy, and advantages obtained in their adoption for marine propulsion. Calculated analysis of steam and fuel consumption of a 50,000-hp. turbine-electric-drive passenger vessel.

Storage-Battery Plant. See STORAGE BATTERIES, Central Stations.

Substations. See SUBSTATIONS.

Superpower. Five New Superpower Steam Stations. Elec. World, vol. 84, no. 84, no. 16, Oct. 18, 1924, pp. 834-838, 5 figs. Turbo-generators totaling 465,080 kw. in 13 units being installed at Toronto, Chicago, Long Beach, Kearny and Peoria; ultimate rating of plants to be 1,392,000 kw.

Switching Equipment. Modern Electric Switch Plants (Ueber moderne elektrische Schaltanlagen), W. O. Schumann. Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 204-220, 44 figs. Discusses excess currents and voltages, resonances, switching, insulators, grounds, buses, etc.

Switching Equipment at the Hanover Central Station (Die Schaltanlagen des Grosskraftwerkes Hannover), H. Probst. Elektro-Jl., vol. 4, no. 8, Aug. 1924, pp. 213-215, 3 figs. Details of switching arrangements; 17,000-kva. generators; 6000 volts stepped up to 45,000-60,000 volt overhead transmission.

Switzerland. Data from Electricity Works in Switzerland for 1922 (Einige zusammenfassende Angaben aus der Statistik der Elektrizitätswerke der Schweiz für das Jahr 1922). Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 2, Feb. 1924, pp. 64-67. Preliminary results of statistics now being compiled on power plants of Switzerland; comparison with statistics for 1919.

Table Giving Power and Quantity of Current Available in 1922 in the Main Central Stations of Switzerland Situated to the North of the Alps and Data of Stations Which Might Render Auxiliary Service (Tableau résumant les puissances et les quantités d'énergie disponibles en 1922 dans les principales centrales d'électricité suisses, situées au Nord des Alpes et celles qui peuvent leur prêter secours), O. Ganguillet. Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 6, June 1924, pp. 265-269, 1 fig. Gives data as to hydro- or thermo-electric capacity in kw. power produced and supplied by 41 stations.

The New Power Station of the Wynau Electricity Supply Co., G. Fisler. Brown Boveri Rev., vol. 11, no. 9, Sept. 1924, pp. 205-208, 3 figs. Describes power plant of Wynau Electricity Supply Co., Langenthal, Switzerland, and gives layout.

Tennessee. Hales Bar Steam Plant on the Tennessee River, L. R. Lee. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1178-1182, 4 figs. Constructed adjacent to 45,000-kw. hydro-electric plant where it has been possible to take advantage of many existing facilities; coal is brought to plant by barges; economizer soot pits connected to boiler ash pits; steam can be extracted from three stages.

Torquay, England. Reorganisation at Torquay. Power Engr., vol. 19, no. 223, Oct. 1924, pp. 373-377 and 385, 10 figs. Describes Newton Abbot power station, with details of generating plant, boiler-house equipment, cooling water, switchgear, etc.

Total-Output Recorders. The Totalization of Power Readings, R. T. Pierce. Elec. Jl. vol. 21, no. 3, Mar. 1924, pp. 103-105, 7 figs. Describes instruments for measuring and recording total output of generating stations.

Tri-Cities, Iowa. 150,000-Kw. Plant for the Tri-Cities (Iowa). Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 726-728, 4 figs. Main turbine unit to be bled at four stages, three for stage feedwater heating and one for evaporator.

Unit Costs. Power Plant Unit Costs and Their Engineering Significance, L. Helander. Elec. Jl., vol. 21, no. 6, June 1924, pp. 285-290, 4 figs. Present unit costs intended to be a guide to engineer undertaking a preliminary survey of desirability of expanding capacity of an existing power station, of building a new station, or of entering into an agreement with an existing power plant for purchase of power, and particularly to assist engineers who are not continuously engaged in power plant erection but find it necessary to make occasional surveys of power generating costs.

Units in Parallel, Efficiency of. Maximum Operating Efficiency of Power Units in Parallel, A. P. Strom. Nat. Engr., vol. 28, no. 5, Mary 1924, pp. 210-212, 2 figs. Water rates of individual units plotted on a combined chart showing total water rate for any combination of units for various loads; most efficient combination of units can at once be determined by reference to chart. Serves equally well for distribution of load in hydroelectric plants.

Victoria, Australia. New Power Plant for Geelong, Vic., Electricity Supply. Commonwealth Engr., vol. 11, no. 4, Nov. 1, 1923, pp. 137-144, 5 figs. Describes condensing water, generating units, boilers, and distributing system; involves generation of 6000 to 6600 volts, 3-phase, 50 frequency.

Vienna, Austria. Post War Electricity Policy of Vienna Municipalities (Die Elektrizitätspolitik der Gemeinde Wien nach dem Kriege), E. Karel. Elektrotechnik u. Maschinenbau, vol. 42, no. 32, Aug. 10, 1924, pp. 232-239 (Elektrizitätswerk), 12 figs. Discusses developments of power houses and power production, steam and hydro-, transformers and substations, mercury vapor rectifiers.

Wabash River Plant, Indiana. Mine Mouth Plant in Indiana Just Put in Service. Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 682-692, 10 figs. Wabash River plant of Indiana Elec. Corpn. transmits energy at 132,000 volts 75 mi. to Indianapolis for distribution; summary of mechanical equipment.

Wainwright Falls, Canada. Power Development at Wainwright Falls, J. S. Wilson. Can. Engr., vol. 47, no. 25, Dec. 16, 1924, pp. 595-599, 7 figs. Describes plant built on Wabigoon river for Dryden Paper Co., Ltd. Capacity, 1400 hp. at 29-ft. head; total area of drainage basin, 870 sq. mi.; details of Moody turbine and other equipment installed.

Water Power vs. Steam Power. Water Power Compared with Steam Power and Their Relation to Rural Service, G. C. Neff. Nat. Elec. Light Assn. Bul., vol. 11, no. 3, Mar. 1924, pp. 152-154. States that only comparatively few of the hydro-electric stations of United States can successfully compete in low cost of generation with large modern well-located steam plants of today. Excerpts of address before Agricultural College of Univ. of Wis.

Waukegan, Ill. New Waukegan Power Station. Power, vol. 59, no. 3, Jan. 15, 1924, pp. 80-86, 11 figs. First unit of 250,000-kw. base-load plant; boilers designed for 400 lb. and 700 deg.; a. c. stoker drive arranged for 40 speeds; coal-handling and feedwater systems; data on mechanical and electrical equipment. See also Power Plant Eng., vol. 28, no. 2, Jan. 15, 1924, pp. 119-126, 8 figs.

Waukegan 400-Lb. Plant Operating. Elec. World, vol. 83, no. 2, Jan. 12, 1924, pp. 78-86, 22 figs. High pressure a feature of new generating station on system of Public Service Co. of Northern Illinois; ultimate rating may be 250,000 kw. or more; mechanical and electrical features.

Weymouth, Mass. Some Engineering Features of the Weymouth Station of the Edison Electric Illuminating Company of Boston, I. E. Moultrop and J. Pope. Universal Engr., vol. 39, no. 2, Feb. 1924, pp. 14-23, 8 figs. Brief description of station and its equipment, with discussion of engineering features of more timely interest; initial main generating equipment to consist of two 32,000-kw. turbines each driving a main 30,000-kw. generator and a 2000-kw. auxiliary generator direct-connected to shaft of main generator.

Williamsport, Md. A 14,000-Kw. Station at Williamsport (Md.), Quickly Designed and Built. Power, vol. 59, no. 10, Mar. 4, 1924, pp. 354-360, 10 figs. Ultimate capacity is 160,000 kw.; economizers and stage bleeders are used; 325 lb. steam pressure; design and erection completed one year after site was purchased, with 3,990,500 kw-hr. generated; other features of Potomac Edison Co.'s station; tabular list of mechanical equipment.

Some Operating Provisions at the Williamsport Station. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 762-764, 2 figs. Describes special ways in which instruments were chosen and arrangements made with view to maintaining both economy and service continuity; generators are to operate in multiple only through transformers.

CENTRIFUGAL CASTING. See PIPE, CAST-IRON, Centrifugally Cast; PIPE, CONCRETE, Centrifugally Cast.

CENTRIFUGAL MACHINES

British Empire Exhibition. Centrifugal Machines at the British Empire Exhibition. Engineering, vol. 117, no. 3052, June 27, 1924, pp. 817-820, 12 figs. partly on supp. plate. Describes different machines exhibited.

CENTRIFUGES

Sharples. Clarification and Dehydration of Liquids. Chem. Age. (Lond.), vol. 11, no. 279, Oct. 18, 1924, pp. 396-397, 2 figs. Applications of Sharples super-centrifuge.

Systems, Selection of. Extraction Systems (Gesichtspunkte für die Auswahl des Extraktionssystems), W. Torwald. Chemiker-Zeitung, vol. 48, nos. 140 and 143, Nov. 20 and 27, 1924, pp. 853-855 and 974-876, 2 figs. Description and critical discussion of stationary and rotary extractors, with special consideration of their efficiency.

CERAMIC MATERIALS

Bibliography. Revised List of Publications on Ceramic Investigations. U. S. Bur. Mines—Reports of Investigations, no. 2645, Oct. 1924, 7 pp. Gives title and author of various publications of Ceramic Experiment Station of Bureau of Mines at Columbus, Ohio, together with other ceramic publications of Bureau published in technical journals and by coöperating agencies; also includes publications on ceramics.

Dielectric-Constant Determination. Determination of Dielectric Constant of Ceramic Material (Die Bestimmung der Dielektrizitätskonstante keramischer Massen), A. Burmester. Archiv für Elektrotchnik, vol. 13, no. 2, May 31, 1924, pp. 146-152, 6 figs. Discusses measuring of dielectric losses in high-tension lines and determination of dielectric constant from angle of dielectric losses and capacity of test piece.

Driers for. Ceramic Raw Materials, Driers and Drying, G. F. Metz. Am. Ceramic Soc.—Jl., vol. 7, no. 7, July 1924, pp. 504-508, 3 figs. Description of certain types of rotary driers used for drying of such ceramic materials as kaolin, chalk, china clay, whiting, fullers' earth, enamel frit, glass sand, feldspar, and various chemicals.

Fine Grinding. See GRINDING, Fine, Theory of.

Thermal-Dilation Measurement. Application of the Interferometer to Measurements of the Thermal Dilation of Ceramic Materials, G. E. Merritt. U. S. Bur. Standards—Scientific Papers, no. 485, Mar. 7, 1924, pp. 357-373, 14 figs. Describes an interference method and apparatus for measuring thermal expansion of ceramic materials.

CERAMIC PLANTS

Heat Economy in. The Problem of Heat Economy in the Ceramic Industry, W. M. Cohn. Am. Ceramic Soc.—Jl., vol. 7, nos. 5, 6 and 7, May, June, and July, 1924, pp. 359-376, 475-488, and 548-562, 34 figs. Determination of specific heat and heat changes for materials employed in ceramics at usual temperatures, including previous attempts at establishing these values. Results of experiments. Bibliography.

Waste-Heat Utilization. Utilization of the Combustion Gases in the Ceramic Industry (Abgasausnutzung in der keramischen Industrie), O. Brandt. Tonindustrie-Zeitung, vol. 48, no. 19, Mar. 5, 1924, pp. 190-192, 5 figs. Gases are used for preheating air and water for steam plants and for heating air for drying plants.

CERAMIC WARE

Firing. The Burning of Ceramics (Particularités des cuissons céramiques), M. D'Arleux. Chaleur et Industrie, vol. 5, no. 53, Sept. 1924, pp. 487-490. Discusses porosity and shrinkage and gives rules for firing in continuous furnaces.

The Oxidation of Ceramic Wares During Firing, G. A. Bole and F. G. Jackson. Am. Ceramic Soc.—Jl., vol. 7, nos. 3, 4, 5, 6, 7, 8, and 9, Mar., Apr., May, June, July, Aug., and Sept., 1924, pp. 163-164, 223-237, 382-396, 427-429, 532-538, 634-642, and 656-662, 26 figs. Mar.: Some reactions of a lower Kittanning fire clay on heating it at various rates to various temperatures in a current of pure oxygen. Apr. and May: Decomposition of various compounds of iron with sulphur under simulated kiln conditions. June: Behavior of calcium compounds in clays. July: Absorption of sulphur gases by ferric oxide in clay. Aug. and Sept.: Quantitative study of nature of sulphur evolution in kiln firing. Published with permission U. S. Bur. Mines.

CERIUM

Influence on Aluminum. See ALUMINUM, Cerium, Influence on.

CHAIN DRIVE

Efficiency. The Efficiency of Chains as a Power Transmitting Agent, H. Seymour. Elec. Rev., vol. 94, no. 2418, Mar. 28, 1924, pp. 484-486, 5 figs. Advantages of chain drive; suggestions for efficiency operation.

Lubrication. Lengthening the Life of the Chain Drive, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 266-272, 12 figs. Lubricating requirements of driving-chain installation; lubrication must be suited to type of chain and to operating conditions.

Roller Centers, Path of. The Path of Roller Centers in Chains, G. M. Bartlett. Machy. (Lond.), vol. 23, no. 592, Jan. 31, 1924, pp. 575-577, 5 figs. Results of investigations of paths followed by centers of chain pins when approaching and departing from sprockets both at high and low speeds.

Silent. The Application of Silent Chain Drive to Machine Tools, Chas. R. Weiss. Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 873-876, 8 figs. Development and characteristics of bushed silent chain; advantages of silent-chain drive; application to machine tools; principles of automatic chain tightener.

Sprockets. An Improved Design of Chain Sprocket Teeth. Chas. R. Weiss, Am. Mach., vol. 61, no. 26, Dec. 25, 1924, pp. 993-996, 8 figs. New tooth forms results in considerably increased chain life; principles applicable to cut teeth as well as cast teeth; pitch line clearance and pressure angles.

Remedying Faults in Sprockets, John S. Watts. Machy. (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 350-351, 2 figs. Effect of changing pitch of driver and of follower; advantages gained by change in pitch; improved sprocket design.

CHAINS

Connecting Links, Pulling Tests of. Results of Pulling Tests of Chain Connecting Links (Mededeeling omtrent de resultaten van trekproeven met sluitings), I. R. Mulder. Ingenieur, vol. 39, no. 20, May 17, 1924, pp. 364-369, 8 figs. Photographs, diagrams and tables of test results for chain connecting links of various sizes, pin diameters varying from ¼ in. to 2 in.

Crane. Using Crane Chains with Safety, A. V. de Forest. Iron Trade Rev., vol. 75, no. 15, Oct. 9, 1924, pp. 942-943. Discusses overload. Annealing a protective factor, but no "cure-all" for overloading. Inspection and measurement will avert failure in operation. Abstract of paper read at Nat. Safety Congress.

Malleable-Iron. Malleable Iron Chain, J. W. Gardom. Foundry Trade Jl., vol. 29, no. 398, Apr. 3, 1924, pp. 269-272, 8 figs., and (discussion), no. 399, Apr. 10, 1924, pp. 301-304. Description of manufacturing methods, including molding and annealing, and metallurgical considerations.

Manufacture of Malleable Chain, H. R. Simonds. Abrasive Industry, vol. 5, no. 12, Dec. 1924, pp.

307-309, 7 figs. Chain links are molded carefully and finished by grinding on vitrified and rubber wheels; automatic machines are used for assembling.

Roller, High-Speed. High-speed Roller Chains, G. M. Bartlett. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 22-23, 2 figs. Discusses limits of permissible chain velocities.

Silent, Manufacture of. The Story of Morse Chain, C. G. Priebe. Am. Mach., vol. 60, nos. 20, 22, 24, and 26, and vol. 61, nos. 2 and 4. 69, 71, and 145-148, 50 figs., May 15, 29, June 12, 26, July 10 and 24, 1924, pp. 737-740, 811-814, 887-889, 959-962. May 15: Development of chain and its manufacture; growth of Morse Chain Co.; layout of units of plant. May 29: How sprocket wheels are made. June 12: Drawing operations; forming pin stock; carbonizing; press work on pints. June 26: How links are stamped out and hardened. July 10: How chain is assembled, riveted, inspected, and packed for shipment. July 24: Typical applications of silent chain for power transmission.

Strength Tests. Report on the Results of Tests on Strength of Chains (Mededeeling omtrent de resultaten van trekproeven met kettingen), I. R. Mulder. Ingenieur, vol. 39, no. 42, Oct. 18, 1924, pp. 815-819, 5 figs. Extensive tests of strength of chains, carried out by Dutch Bur. Standards; tables and diagrams; specifications of various associations.

CHARCOAL

Active. Active Charcoal (Ueber aktive Kohle), O. Ruff and E. Hohlfeld. Kolloid-Zeit, vol. 34, no. 3, Mar. 1924, pp. 135-139. Activity and content of foreign atoms; hypothesis previously put forward that activity was proportional to content of certain foreign atoms, has been tested by preparation and examination of 15 specimens of active charcoal; data obtained show that original hypothesis must be abandoned, since activities of charcoals examined cannot be correlated with their oxygen or nitrogen content.

Electric Conductivity. See COKE, Electric Conductivity.

Manufacture. Charcoal (Le charbon de bois). Nature, no. 2634, Sept. 27, 1924, pp. 193-195, 5 figs. Discusses different methods of production in France.

Phosphorus Content of Pine, Effect of. Phosphorus Content of Fir and Pine and Its Influence on Their Use for Charcoal Production (Fosforhalten i furu och gran med särskild hänsyn till framställning av träkol), H. von Eckermann. Jernkontorets Annaler, vol. 108, Tekniska Diskussionsmötet May 31, 1924, pp. 115-191, 51 figs. Extensive tests in Swedish forests have proved that content of phosphorus is larger in branches than in trunk of tree, is larger in surface lumber than in core lumber, differs with locality, is larger for younger trees, and changes with seasons.

CHARTS

Alignment. See ALIGNMENT CHARTS.

Application in Industry. Application of Charts in Industry, D. B. Porter. Mgmt. & Administration, vol. 7, nos. 1 and 3, Jan. and Mar. 1924, pp. 65-72, 12 figs.; and 329-336, 10 figs. Jan.: Management-data summary; presents historical charts drawn chiefly from fields of sales and financial data. Mar.: Application of charts which show frequency with which events occur under conditions of non-historical nature.

Construction and Functions. The Construction of the Principal Types of Charts Employed in Industry. Note sur la construction des principaux types d'abaques employés dans l'industries), P. Cayère. Arts & Métiers, vol. 77, no. 41, Feb. 1924, pp. 45-62, 24 figs. Discusses different types of charts and explains their various functions.

Conversion. Engineering Conversion Chart, P. W. Swain. Power, vol. 60, no. 11, Sept. 9, 1924, p. 413. Chart which can be conveniently used to change a quantity expressed in one engineering unit to a corresponding unit. Will save much time in problems of this sort where an accuracy of one per cent (practical limit in reading scales of this size) is sufficient, as is frequently the case.

Gantt. See INDUSTRIAL MANAGEMENT, Gantt Charts.

Instructional Purposes. The Diagram and Its Use for Instruction Purposes in Continuation Schools (Das Diagramm und seine Verwendung also Anschauungsmittel im Unterricht der Fortbildungsschule), L. Werner. Werkstattstechnik, vol. 18, nos. 7 and 8, Apr. 1 and 15, 1924, pp. 209-214 and 237-244, 27 figs. Most important kinds and forms of diagrams with special regard to enlightening public with regard to industrial facts and conditions; importance of diagram as subjective and objective medium of instruction.

Nomograms. Applications of a Type of Nomogram with Rectilinear Scales (Quelques applications d'un type de nomogramme à échelles rectilignes), J. Hak. Annales des Ponts & Chaussées, vol. 93, no. 6, Nov. -Dec. 1923, pp. 375-386, 5 figs. Describes methods of application.

Production Reports. Charts for Report Purposes, H. N. Stronck. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 705-709, 6 figs. Treatment of larger production charts; reproductions of charts; photostat reproduction of special material; lettering of charts; chart showing percentage fluctuations; arrangement of charts in report.

CHEMICAL ANALYSIS

Metals, Methods for. Critical Studies on Methods of Analysis, L. A. Congdon and others. Chem. News, vol. 128, nos. 3329, 3331, 3332, 3333, 3339, 3340, 3341, and 3342, Feb. 1, 15, 22, 29, Apr. 11, 17, 25, and May 2, 1924, pp. 67-71, 98-100, 116-120, 132-134, 233-236, 244-246, 266-268 and 274-276. Methods of analysis and results of experiments made with them. Feb. 1: Nickel, chromium, and manganese. Feb. 15: Aluminum. Feb. 22: Cadmium and molybdenum. Feb. 22: Cobalt. Apr. 11: Cerium. Apr. 17: Calcium. Apr. 25: Selenium. May 2: Barium.

CHEMICAL INDUSTRY

Machinery for, Design of. Relations between Chemical and Mechanical Industries (Beziehungen zwischen der chemischen und der mechanischen Industrie), A. Krauss. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 1 and 2, Jan. 5 and 12, 1924, pp. 1-5 and 22-24, 11 figs. Discusses most important aspects for construction of apparatus and machines in dry and nitrogen industry; importance of material research and behavior of most important structural materials; importance of heat economy, gas technology, and conveying plants; duties of the engineer.

Power and Heat Economy. Power and Heat Economies in the Chemical Industry (Kraft-und Wärmewirtschaft in der chemischen Industrie), E. Praetorius. Chemiker-Zeitung, vol. 48, no. 68, June 5, 1924, pp. 377-380, 1 fig. Discusses advantages of steam over Diesel; power and heat worked separately and in combination; back pressure engines and their efficiency.

Processes and Apparatus. Chemical Processes and Apparatus. Abridgments of Specifications (Lond.), Class 1 (i), 1924, Period 1916-20, 115 pp. Patents for inventions.

Pumps for. See PUMPS, Chemical Industry.

CHEMICAL PLANTS

Chimneys for. See CHIMNEYS, Chemical Plants.

Corrosion. In. See CORROSION, Chemical Plants.

Fire-Fighting Equipment. See FIRE FIGHTING, Chemical Plants; Equipment.

Fire Protection. See FIRE PROTECTION, Dyestuffs Plants.

Fuel Economy. Fuel Economy in Chemical Works, C. Elliot and H. W. Hollands. Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1920, Mar. 7, 1924, pp. 277-279, 3 figs. Evaporation problem in caustic-soda manufacture; preheated secondary air for caustic pots; results of large-scale tests; powdered fuel firing for caustic pots; powdered fuel for rotary dryers; cement kiln firing, etc.

Maintenance and Repair. Maintenance and Repair of Chemical Plants in Winter, H. Bücher. Chem. Age (N. Y.), vol. 32, no. 3, Mar. 1924, pp. 148-150. Suggestions.

Safety against Explosions. See BUILDING CONSTRUCTION, Chemical Plants.

Steam Economy. The Limitation of Steam Consumption in Chemical Works, C. F. Holmboe. Chem. & Industry, vol. 43, no. 37, Sept. 12, 1924, pp. 911-913, 3 figs. Author describes his method of economizing steam, which has proved satisfactory without complicating plant.

CHEMICALS

Manufacture, Corrosion Problems in. Corrosion—The Constant Menace of the Chemical Industry. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 61-69, 3 figs. Survey of corrosion problems in manufacture of following chemical products, with notes on means for reducing them: sulphuric acid, hydrochloric acid, nitric acid, electrolytic alkali and bleach, dyestuffs and intermediates, alum, salt solutions, ammonium nitrate, and acetic acid.

Storage. Efficient Bulk Storage of Chemicals in Powdered Form, G. F. Zimmer. Chem. Age (Lond.), vol. 11, no. 272, Aug. 30, 1924, pp. 210-211, 1 fig. Describes method of getting over difficulty of handling materials which tend to form cakes or lumps during storage.

CHEMISTRY

Atomic Weights. See ATOMS, Atomic Weights.

Colloid. See COLLOIDS, Chemistry of.

Industrial. The Third Congress of Industrial Chemistry (Le troisième Congrès de Chimie Industrielle), Ch. Berthelot. Revue de Métallurgie, vol. 21, no. 3, Mar. 1924, pp. 143-163, 5 figs. Review of contributions on analytical chemistry, fuels, ceramics, and products of synthetic ammonia.

CHIMNEYS

[See also STACKS.]

Calculation. The Calculation of Chimneys (Le Calcul des Cheminées), A. Grebel. Chaleur & Industrie, vol. 5, no. 45, Jan. 1924, pp. 13-22, 8 figs. Method developed by author, extracted from work entitled, Gas & Coke, by Grebel and Bouron.

Chemical Plants. What a Chimney Has to Do. Chem. & Met. Eng., vol. 31, no. 24, Dec. 15, 1924, pp. 930-933, 6 figs. Difficulties encountered in design of chimneys in chemical engineering industries.

Construction. How Should Chimneys Be Constructed? Contract Rec., vol. 38, nos. 36 and 37, Sept. 3 and 10, 1924, pp. 875-877 and 899-902, 12 figs. Discusses simple, practical and inexpensive measures to insure erection of safe chimneys, flues, and fireplaces.

Design. Design of Chimneys and Stacks for Power Plant Boilers, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 12, Dec. 1924, pp. 585-588, 3 figs. Notes on reinforced-concrete and steel chimneys; draft produced by chimneys; effect of stack height on capacity.

How and Why Are Chimneys? Sheet Metal Worker, vol. 15, nos. 2 and 3, Feb. 15 and 29, 1924, pp. 37-40, 74-75, and 98, 7 figs. Principles of design, construction and operation, with explanation of cause of draft, reasons for failures, etc.

The Design of Chimneys, W. S. Findlay. Power Engr., vol. 19, no. 219, June 1924, pp. 226-228, 5 figs. Factors in design of chimney shafts, with special reference to their stability.

Draft and Capacity. Draft and Capacity of Chimneys, J. G. Mingle. Combustion, vol. 10, nos. 3, 4, 5, 6, and 7, and vol. 11, nos. 2, 3, 4, 5, and 6, Mar. Apr., May, June, July, Aug., Sept., Oct., Nov., and Dec. 1924, pp. 186-193, 270-278, 354-360, 424-431, 67-74, 134-144, 219-225, 289-293, 364-369, and 444-452 and 457, 78 figs. Mar.: Draft and its importance. Apr.: Theory of natural draft. May and June: Available draft and losses due to velocity and friction. July: Draft performance of chimneys. Aug.: Required draft and general draft equation. Sept.: Height of chimney. Oct., Nov. and Dec.: Theory of capacity.

Theory of Draft (Théorie du tirage), N. Peters. Association des Ingénieurs Sortis des Ecoles Spéciales de Gand—Annales, vol. 14 (Series 5), 1924, pp. 129-140. Formulas for calculating dimensions of stacks, heat losses, etc.

Flues. Chimneys for Heating Boilers, A. G. King. Domestic Eng. (Chicago), vol. 106, no. 7, Feb. 16, 1924, pp. 20-23, 5 figs. Elements of a chimney flue and its proper position and construction.

Reinforced-Concrete. Concrete Chimney to Serve Two Breechings, C. W. Geiger. Power Plant Eng., vol. 28, no. 4, Feb. 15, 1924, pp. 240-242, 1 fig. Brick division wall at breeching openings carried on reinforced-concrete beam placed just below these openings.

Monnoyer System of Construction of Reinforced Concrete Stacks (Komíny a nádrze ze zelezového betonu systému Monnoyerova), J. Polivka. Zprávy Verejné Sluzby Technicke, vol. 6, no. 3, July 1, 1924, pp. 88-95, 10 figs. General discussion including complication of static forces acting on chimney.

Reinforced-Concrete in Stack Construction (Der Eisenbeton im Schornsteinbau), E. Lupescu. Beton u. Eisen, vol. 23, nos. 14 and 15, July 20 and Aug. 5, 1924, pp. 188-190 and 201-204 Discusses reinforced-concrete stack failures; criticizes faulty constructions and proposes specifications for design and construction.

Standardization of Reinforced-Concrete Stacks (Zur Normung des Eisenbetonschornsteins), J. Hingerle. Beton u. Eisen, vol. 23, no. 21, Nov. 5, 1924, pp. 283-285, 3 figs. Discusses a wall unit of stack small enough to be heated as straight beam unit, and calculates bending moment and tension at edge due to temperature in connection with reinforcing, and crack formation in stacks, and makes corresponding suggestions for standard construction proposed in article by Lupescu.

The Calculation of Tall Reinforced-Concrete Factory Chimneys (Il calcolo dei camini alti in cemento armato), N. Kelen. Ingeneria, vol. 3, no. 2, Feb. 1, 1924, pp. 61-63, 7 figs. Shows their superiority over those of brick, and discusses, with example, stresses by static load and by difference of temperature at inside and outside of wall.

Size Determination. How to Determine the Proper Size of Chimney, T. S. Clark. Power, vol. 60, no. 5, July 29, 1924, pp. 175-179, 1 fig. Ex-

plains in a practical manner necessary elements for determining proper size of chimney for a given installation. Includes typical examples.

Steel. Steel Chimneys, F. Johnstone-Taylor. Power Engr., vol. 19, no. 215, Feb. 1924, pp. 45-48, 9 figs. Survey of characteristics and advantages of steel chimneys.

Suction Draft for. On Artificial Draft in Steam Boiler Plants (Ueber den künstlichen Zug bei Dampfkesselanlagen), C. Rühl. Wärme- u. Kälte-Technik, vol. 26, no. 15, Aug. 1, 1924, pp. 123-126, 9 figs. Discusses types of drafts and describes evaporator-suction draft plant with Rhomboid regulator (German patent) and its advantages.

CHLORINE

Analysis. Critical Studies on Methods of Analysis, L. A. Congdon, W. B. Crabtree, H. W. Coles, L. L. Smith and M. L. Vehalgo. Chem. News, vol. 129, nos. 3370, 3371, and 3372, Nov. 14, 21, and 28, 1924, pp. 302-304, 317-320, and 334-337. Estimation and determination of chlorine. Bibliography.

Hydrochloric Acid from. Industrial Outlets for Chlorine, P. S. Brallier. Chem. & Met. Eng., vol. 30, no. 16, Apr. 21, 1924, pp. 624-626. Discusses hydrochloric acid and organic compounds as methods of consuming chlorine on commercial scale.

Industrial Products. A Survey of Products That Afford Industrial Outlets for Chlorine, P. S. Brallier. Chem. & Met. Eng., vol. 30, nos. 13 and 14, Mar. 31 and Apr. 7, 1924, pp. 508-510 and 542-545. Mar. 31: Technical and economic position of bleach, liquid chlorine and carbon tetrachloride and their significance to producers of chlorine. Bibliography. Apr. 7: Chloroform and metallic chlorides.

Production. Modern Practice in Electrolytic Chlorine-Caustic Production, H. J. Payne. Chem. & Met. Eng., vol. 31, no. 9, Sept. 1, 1924, pp. 334-338, 12 figs. Practice at plant of Eastern Electro-Chemical Co., Bangor, Me. Chemical engineering plays important rôle in applying theory to efficient practice.

The Canadian Salt Company's Processes for the Manufacture of Alkali-Chlorine Products, D. A. Pritchard and G. E. Gollop. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1056-1062, 8 figs. Deals with methods and processes at Sandwich Works of Can. Salt Co. in Ontario.

CHLORONOME. See CONDENSERS, STEAM, Tubes; WATER TREATMENT, Chlorination.

CHROMATES

Production from Ferro-Chromium Anodes. The Production of Chromates from Ferro-Chromium Anodes, M. DeK. Thompson. Am. Electrochem. Soc.—Advance paper no. 3, for meeting Oct. 2-4, 1924, pp. 37-50, 3 figs. Results of investigations carried out to study production of sodium chromate from ferro-chromium anodes under different conditions of current density, temperature, concentration of hydrate solution, and chromium content of anode. Results obtained on effect of various factors on current efficiency and energy efficiency of production of sodium chromate from ferro-chromium anodes.

CHROME-NICKEL STEEL

Carbides. The Carbides in Nickel Chromium Steels, J. H. Andrew and H. Hyman. West of Scotland Iron & Steel Inst.—Jl., vol. 31, parts 6 & 7, Mar.-Apr. 1923-1924, pp. 116-123, 10 figs. Discusses analysis of carbides in samples water-quenched from 770 deg. cent. and tempered at 650 deg. cent. for 3 hr., and water quenched from 1200 deg. cent. and tempered at 650 deg. cent. for 3 hrs.

Deoxidation, Influence of. The Influence of Deoxidation on Hot-Working Capacity and Properties of a Chrome-Nickel Structural Steel (Der Einfluss der Deoxydation auf die Warmverarbeitbarkeit und die Eigenschaften eines Chromnickel-Baustahles), W. Oertel and L. A. Richter. Stahl u. Eisen, vol. 44, no. 7, Feb. 14, 1924, pp. 169-175, 5 figs. Investigation of cracks; influence of casting temperature and speed, rolling temperature, and time required for heating rolling material; deoxidation and distillation; properties of steel produced under different conditions.

Non-Rusting. Non-Rusting Chromium-Nickel Steels, B. Strauss. Am. Soc. for Testing Mats. —Reprint of paper for meeting June 24-27, 1924, no. 19e, 10 pp., 5 figs. Valuable properties of chromium as an alloy with iron and steel, and experiments which led to development of two chromium-nickel steels in Physical Research Laboratory of Messrs. Krupp, Germany; results of corrosion tests, physical and metallographic properties, properties under elevated temperatures, and applications of these steels.

CHROME STEEL

Hardness. Secondary Hardness in Austenitized High Chromium Steels, Edgar C. Bain. Am. Soc. Steel Treating—Trans., vol. 5, no. 1, Jan. 1924, pp. 89-101 and (discussion) 101-105, 14 figs. Summary of hardness measurements made with Rockwell hardness tester on four grades of high-carbon, high-chrome steel with variety of quenches and series of draws; sample tools made from these steels in which secondary hardness had been developed after having been quenched austenitic gave results in cutting speed between that of carbon steel and high-speed steel.

Line of Solubility. The Verification of the Line of Solubility for Carbon in Chrome and Tungsten Steels (Nachprüfung der Löslichkeitslinie für Kohlenstoff in Chrom- und Wolframstählen), P. Oberhoffer, K. Daeves and F. Rapatz. Stahl u. Eisen, vol. 44, no. 16, Apr. 17, 1924, pp. 432-435, 7 figs. Previous works; use of constant slides; discussion of structure reproductions obtained; solubility and pearlite line.

Properties. Chromium—Its Uses and Its Alloys, W. M. Mitchell. Forging—Stamping—Heat Treating, vol. 10, no. 8, Aug. 1924, pp. 303-306, 13 figs. Chromium in steel lessens thermal conductivity; property is of importance when heat treating large forgings.

CHROMITE

World Trade. World Trade in Chromite, H. M. Hoar. Trade Information Bul. (Supp. to Commerce Reports), no. 252, Aug. 11, 1924, 33 pp., 2 figs. International factors; growth of British dominance in chromite industry; uses of chromite; world production; foreign and United States chromite resources and trade; importance of chromite to leather industry; chromium chemical derivatives.

CHROMIUM

Applications in Chemical Industry. The Importance of Chromium to the Chemical Engineer, Chem. & Met. Eng., vol. 30, no. 4, Jan. 28, 1924, pp. 149-151. Notes on nickel-chromium alloys; chrome irons; metallic chromium.

Estimation. Notes on the Estimation of Chromium, H. T. S. Britton. Analyst, vol. 49, no. 576, Mar. 1924, pp. 130-133. Discusses gravimetric and volumetric estimation, giving results of tests.

Plating Steel with. See ELECTROPLATING, Chromium Plating of Steel.

Production. Production of Pure Chromium by Direct Reduction of the Oxide by Means of Hydrogen (Die Darstellung reinen Chroms durch unmittelbare Reduktion des Oxydes mit Wasserstoff), W. Rohn. Zeit. für Metallkunde, vol. 16, no. 7,

July 1924, pp. 275-277, 1 fig. Discusses difficulties in preparation of pure metals not easily reducible, hydrogen as advantageous reduction agent, production of strongly circulating current of pure hydrogen, and its application in production of pure metallic chromium.

Structure of. The Structure of Chromium, H. Collins. Chem. News, vol. 129, no. 3372, Nov. 28, 1924, pp. 331-334. Presents proof of constitution and structure of atom of chromium, from which deductions are made.

Uses. Chromium—Its Uses and Its Alloys, W. M. Mitchell. Blast Furnace & Steel Plant, vol. 12, nos. 8, 10, and 11, Aug., Oct., and Nov. 1924, pp. 372-375, 452, 455, and 504-507, 13 figs. Use in steel industry for manufacture of alloy steels and heat- and corrosion-resisting alloys. See also Forging—Stamping—Heat Treating, vol. 10, nos. 3, 6, 9, and 10, May, June, Sept., and Oct. 1924, pp. 199-202, 235, 238, 357-359, and 373-374, 7 figs.

CHROMIUM STEEL

Stainless. See STEEL, Stainless.

CHRONOGRAPHS

Aberdeen. The Aberdeen Chronograph, D. A. Millar. Army Ordnance, vol. 4, no. 22, Jan.-Feb. 1924, pp. 219-222, 5 figs. Description of short-time measuring instrument developed for purpose of eliminating some of the errors attendant upon firing of small-caliber guns for velocity.

Ballistic. Modern Measuring Instruments for Ballistic and General Scientific and Technical Research Purposes (Neuzeitliche Messgeräte für ballistische und allgemein wissenschaftlich und technische Forschungszwecke), F. Duda. Zeit. für das gesamte Schiess- und Sprengstoffwesen, vol. 19, no. 7, July 1924, pp. 100-104, 11 figs. Design and construction of ballistograph and micro-time-measuring instrument, and their operation, separately and in combination.

CHRONOMETERS

Phonic. The Phonic Chronometer, A. B. Wood and J. M. Ford. Jl. Sci. Instruments, vol. 1, no. 6, Mar. 1924, pp. 161-173, 6 figs. Electrically controlled chronometer which is capable of directly indicating time intervals with accuracy of one-thousandth of second; it is driven by powerful phonic motor, which is controlled by tuning fork of adjustable frequency; used for measurement of time in physical investigations, sound ranging, depth sounding and in hydrographical survey, psychological measurements, automobile speed events, and electrical investigations.

CHRYSOLITE. See ASBESTOS, South Africa.

CHUCKING MACHINES

Automatic. New Chucking Machine Is Pneumatically Controlled and Operated. Automotive Industries, vol. 50, no. 23, June 5, 1924, pp. 1230-1232, 4 figs. See also Iron Age, vol. 113, no. 22, May 29, 1924, pp. 1574-1575, 3 figs. New Britain Machine Co. has developed completely automatic chucking machine, called New-Matic in 4- and 6-spindle types, which is adapted to many automotive-production operations and is so arranged that an operator can attend to two machines.

Multiple-Spindle. Gridley Chucking Machine. Iron Age, vol. 113, no. 23, June 5, 1924, pp. 1644-1645, 4 figs. Multiple-spindle unit for large and accurate output; air-operated chucks a feature.

CHUCKS

Machining Valves and Pipe Flanges. Machining Valves and Pipe Flanges, Chas. O. Herb. Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 171-174, 10 figs. Use of special chucks and tooling equipment designed with view to obtaining high production; equipment is used for finishing pipe flanges on Libby turret lathes built by Int. Machine Tool Co., Indianapolis.

CHURCHES

Heating. See HEATING, Churches; HEATING, ELECTRIC, Church and Schoolroom.

CIRCUIT BREAKERS

Aerothermic. Aerothermic Breaking Device for Lighting Stairs, Flags and Light Signals (Rupteurs aérothermiques pour minuterie d'escalier, enseignes et signaux lumineux), F. Cellerier. Revue Générale de l'Électricité, vol. 16, no. 9, Aug. 30, 1924, pp. 356-359, 5 figs. Describes device for automatic breaking of circuit, whose action is controlled by expansion of air, heated by electric current; it is used for intermittent lighting of various kinds.

Birka. The Birka Regulator and Its Importance in Connection with the Use of Electricity in Homes (Birkaregulatorn och dess betydelse för hemmens elektrifiering), A. Westerberg. Teknisk Tidskrift, vol. 54, no. 5, Feb. 2, 1924, pp. 24-28 (Elektroteknik), 5 figs. New type of automatic circuit breaker, based on discovery that tungsten contacts in a vacuum or neutral gas very effectively break electric currents. Its various uses in connection with electrical appliances.

High-Speed. Thomson-Houston Extra-Rapid Circuit Breakers (Le disjoncteur extra-rapide Thomson-Houston), L. Vernier and M. Wilfart. Revue Générale de l'Électricité, vol. 16, nos. 9 and 10, Aug. 30 and Sept. 6, 1924, pp. 339-351 and 387-397, 39 figs. Detailed description of Thomson-Houston circuit breakers as satisfying all conditions required of high-speed breakers.

High-Voltage. High-Voltage Circuit Breakers, A. W. Copley. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 17-18. Describes circuit breakers, manufactured for service Southern Cal. Edison Co., with high rupturing capacity and resigns following closely standard designs for more moderate voltages.

High-Voltage Circuit Breakers, J. S. Jenks. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 715-718. Discusses question from operator's point of view, gives experiences with West Penn system.

See also Oil Type.

Insulating Oils for. See OILS, Insulating.

Laboratory Thermostats. A New Design Circuit Breaker for Laboratory Theromstats, G. Fred. Smith and C. E. Hollister. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1162-1163, 4 figs. Describes apparatus designed to eliminate difficulties met in use of telegraphic instrument.

Oil Type. Analysis of Oil Circuit Breaker Requirements for Large Steel Plants, M. J. Wohlgemuth. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 411-413, 7 figs. Discusses conditions in typical plant which had badly mixed-up system; distribution system was entirely revamped and network installed which gives uninterrupted service at all substations.

Construction, Selection and Operation of Automatic Oil Circuit Breakers (Interruttori automatici in olio—Loro costruzione, scelta, impiego), O. L'Eplattenier. Elettrotecnica, vol. 11, no. 10, Apr. 5, 1924, pp. 222-229, 11 figs. Comprehensive treatment of entire subject with particular consideration of latest accomplishments. Discusses electrostatic and thermodynamic phenomena. Manufacturing influence upon phenomena of rupture explained by considering material, form and length of contacts, number of ruptures, their velocity and their measurements. Requirements an automatic oil circuit breaker must meet. Charts reporting practical and experimental data.

Directions for Selecting Circuit Breakers for High Tension A. C. Installations (Directives pour le choix des interrupteurs des installations à courant alternatif à haute tension), B. Bauer. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 5, May 1924, pp. 210-228, 6 figs. Gives definition of terms, necessary data for selection, calculation of disruptive circuit, protective resistances for circuit breakers.

High-Voltage Oil Circuit Breaker Tests, Alabama Power Company System, J. B. MacNeill. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 436-441, 16 figs. Series of 50 high-voltage oil-circuit breaker tests made during May and June of 1922.

Maintenance of Oil Circuit Breaker Operating Mechanisms, H. L. Biggin. Power, vol. 60, nos. 19 and 20, Nov. 4 and 18, 1924, pp. 721-723 and 797-800, 14 figs. Operation and care of oil circuit breakers of ratings up to 15,000 volts. Nov. 4: Care of operating mechanisms. Nov. 18: Care of switch contacts and oil.

Oil Circuit Breaker Investigation as Carried on with a 26,700-Kv-a. Generator, J. D. Hilliard. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 818-824, 16 figs. Discusses some of the characteristics of oil circuit breakers as determined from tests with this equipment, and indicates effect of some of the factors considered; oil viscosity and other oil characteristics; duty cycle tests.

135,000 V Outdoor Oil Circuit Breaker. Electrician, vol. 92, no. 2402, May 30, 1924, pp. 662-663, 4 figs. New Ferguson Pailin product. Three-phase automatic.

Quick-Acting. See CONVERTERS, Rotary.

Syntonic. Bruné Electro-Sytonic Circuit Breakers (Interruttore elettro-sintonico Bruné), P. Lana. Elettrotechnica, vol. 11, no. 19, July 5, 1924, pp. 452-454, 6 figs. Details of design and construction of circuit breaker based on principle of mechanical syntony, and applied to lighting system of town of Ferrara.

Tests. Circuit Breaker Tests at Bessemer, Ala., J. D. Hilliard. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 430-435, 13 figs. Tests on 300-ampere, 110,000-volt breakers, and on plain break and explosion-chamber 44,000-volt breakers.

CITIES

Congestion in. Study in Problems of Urban Growth, T. Adams and H. L. Seymour. Can. Engr., vol. 47, no. 22, Nov. 25, 1924, pp. 543-549, 3 figs. Forms and causes of congestion in modern cities; problems in Toronto; building and street congestion; sunlight and high buildings.

Finance and Improvement Policies. Municipal Finance and Improvement Policies, H. G. McGee. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 230-232. Study of expenditures and receipts of cities of 30,000 and upward, 1903 to 1921, with suggestions as to policy to govern capital outlays for improvements.

CITY PLANNING

[See also PORTS, Planning.]

Brantford, Kansas. Town Planning Progress at Brantford, A. E. K. Bunnell. Can. Engr., vol. 47, no. 12, Sept. 16, 1924, pp. 334-336. Part of report presented to Brantford City Council by Brantford Town Planning Commission; proposals made by engineer for layout of streets and general improvements to city.

Canada. A Review of Recent Town Planning Accomplishment in Canada, H. L. Seymour. Contract Rec., vol. 38, no. 53, Dec. 31, 1924, pp. 1297-1301, 1 fig. Public interest in movement is being fostered and importance of subject impressed upon municipal bodies. Kitchener, Waterloo and Point Grey are most advanced in town planning progress.

Review of Town Planning in Canada, T. Adams. Can. Engr., vol. 46, no. 26, June 24, 1924, pp. 651-653. Status in Canada before and during War and since that period. Author considers that much progress has been made.

Detroit Super-Highway Plan. Greater Detroit's Proposed Super-Highway Plan. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 59-61, 1 fig. See also Eng. & Contracting (Roads & Streets), vol. 62, no. 2, Aug. 6, 1924, pp. 283-287, 1 fig. Discusses congestion problem and more surface lines needed.

Garden-City Plans. Carrying out Mariemont Plan for a Self-Contained Town, Glenn Hall. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 580-582, 1 fig. Town planning and sound municipal engineering along lines of English Garden cities for new suburb of Cincinnati.

Garden Cities of French Northern Railway Co. (Les Cités-Jardins de la Compagnie du Chemin de Fer du Nord), P. Calfas. Génie Civil, vol. 84, no. 9, Mar. 1, 1924, pp. 197-203, 21 figs. Describes plans of new garden cities built in devastated area by Compagnie du Chemin de Fer du Nord, including layout, types of houses, etc.

Height of Buildings. Higher Building in Relation to Town Planning, R. Unwin. Roy. Inst. British Architects—Jl., vol. 31, no. 5, Jan. 12, 1924, pp. 125-140, and (discussion) 141-150, 19 figs. partly on supp. plates. Arguments against adoption of high buildings, including effect of high buildings on transport problem.

Highway Traffic, New York City. Regional Highway Traffic Problem of New York City, E. P. Goodrich and H. M. Lewis. Eng. News-Rec., vol. 92, no. 22, May 29, 1924, pp. 941-943, 4 figs. Physical survey discloses conditions forecasting traffic development calling for belt roads and city entrances. (Abstract.) Paper presented at conference on traffic, New York, under direction of Committee on Regional Plan of New York and Its Environs.

Highways and Traffic. Highways and Traffic, F. S. Besson. Soc. Automotive Engrs.—Jl., vol. 14, no. 6, June 1924, pp. 594-601, 18 figs. Dividing streets into three classes, rapid transit and local streets and traffic highways, author defines these terms and, using original plan of City of Washington and present street conditions there as basis of illustration, comments thereon and shows how important adequate city planning is in its bearing on traffic problem and what great foresight it requires.

Industrial Villages. See HOUSING, Industrial Villages.

Kitchener and Waterloo, Ont. Planning of Kitchener and Waterloo, Ont., H. L. Seymour. Can. Engr., vol. 47, no. 2, July 7, 1924, pp. 125-130, 3 figs. Developments leading up to preparation of comprehensive town planning scheme now nearing completion; proposals by experts; summary of conclusions and recommendations submitted by consulting engineers; elimination of level crossings.

Mining Town. See HOUSING, Miners' Dwellings.

Montreal Project. Considerations on a Project of Town Planning for the Island of Montreal, S. J. Fortin. Eng. Jl., vol. 7, no. 10, Oct. 1924, pp. 639-643. Outline of plan for establishment of town-planning commission to investigate and report on project.

National Planning as Aid to. National Planning as Aid to City Planning, R. W. Putnam. Ports & Waterways, vol. 1, no. 2, Aug. 1924, pp. 62-66 and 85-86, 4 figs. Discusses harbor facilities for bulk interchange at Chicago.

New York City, Replanning. City Replanning. Public Works, vol. 55, no. 8, Aug. 1924, pp. 258-260, 5 figs. See also Engrs. & Eng., vol. 41, no. 7, July 1924, pp. 173-182, 5 figs. Proposal for relieving street congestion by parking inside building lines and placing sidewalks level with second floor. Abstract of paper read before Am. Soc. Civil Engrs.

Pittsburgh. Solution of the Transportation, Parking and Flood Problems of Pittsburgh, E. K. Morse. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 5, June 1924, pp. 183-202, and (discussion) 203-216, 7 figs. Discusses character of traffic, congestion, relief, river walls, rapid transit, design of elevated tracks and stations, wharves, subways, navigation, floods, etc.

Principles. Regional and Metropolitan Planning Principles, G. B. Ford. Can. Engr., vol. 46, no. 2, Jan. 8, 1923, pp. 127-130. Methods of controlling and directing development of towns and cities; difference between regional and city planning; zoning ordinances; regulation of traffic; principles of regional planning; decentralizing industry; financing regional plan. From paper read at Nat. Conference on City Planning, Baltimore.

Street Planning. Changing the Horse-and-Buggy Road to Fit the Automobile, S. D. Waldon. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 521-531, 10 figs. Describes master plan to which Detroit is endeavoring to make its street improvements conform, and offers suggestion that additional rights-of-way should be acquired at once; outlines plan for superhighway that will meet modern requirements and make rapid operation safe.

Increasing the Capacity of Existing Streets, A. S. Tuttle. Am. Soc. Civ. Engrs.—Proc., vol. 50, nos. 5 and 10, May and Oct. 1924, pp. 593-605, and (discussion) 1311-1314, 6 figs. Consideration of following expedients for City of New York: Requiring new buildings to be set back to lines proposed as ultimate limits of widened streets; widening of roadways; more drastic traffic regulations; removal of roadway encroachments; by-passing of traffic; introduction of arcades.

Street Planning for Relief of Congestion at Bridges, Chas. W. Leavitt. Eng. News-Rec., vol. 92, no. 23, June 5, 1924, pp. 974-975. Widening of approaches; variable-speed traffic zones; separation of rapid-transit lines recommended. (Abstract.) Paper read before Nat. Conference on City Planning.

Traffic Congestion and. See TRAFFIC, Congestion Relief.

Traffic in Relation to. Street Traffic and City Planning. Pub. Works, vol. 55, no. 6, June 1924, pp. 201-206. Extent to which enormous development of city traffic made imperative street widening and other changes in structure and improvements in handling traffic; suggestions made.

Zoning. See HOUSING, Zoning and.

CLASSIFICATION

Dewey Decimal System. See INDEXES, Decimal Classification.

CLAY

Aluminum Chloride from. Preparation of Aluminum Chloride from Clays (Darstellung von Aluminiumchlorid aus Ton enthaltenden Verbindungen), P. P. Budnikoff. Zeit. für angewandte Chemie, vol. 37, no. 8, Feb. 21, 1924, pp. 100-101. From results of experiments in which kaolin, bauxite, aluminum oxide, and aluminum sulphate were separately heated with phosgene at temperatures ranging from 500 to 1000 deg., it would appear to be possible to apply action of phosgene or sulphur chloride on aluminum silicates to purposes of quantitative analysis.

Bentonite. Bentonite. J. Alexander. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1140-1142. Properties; occurrence and origin; composition and uses.

China. The English China Clay Industry, S. P. Bunn. Paper, vol. 33, no. 13, Jan. 17, 1924, pp. 11-13, 6 figs. Extent of development; Cornwall and Devon chief producing centers.

The Winning and Preparation of English China Clay, Geo. Brian. Ceramist, vol. 4, no. 5, Aug. 1924, pp. 270-282, 8 figs. Methods of winning china clay; sand pits; drags; micas; settling pits and tanks; drying kilns and process of drying.

Colloidal Plasticity. Kaolins, Clays, Etc. Colloidal Plasticity. Gel and Sol Phenomena (Kaolins, argiles, etc. Plasticité colloïdale. Phénomènes de gel et de sol), A. Bigot. Académie des Sciences—Comptes Rendus, vol. 178, no. 1, Jan. 2, 1924, pp. 88-90. Points out that some kaolins (those produced by weathering of granite) are not plastic, whereas others (alluvial kaolins) are very plastic; incompletely dehydrated clays give, with appropriate reagents, gels and sols, but this is no longer the case after complete dehydration.

Composition and Properties. The Composition and Properties of Clay, A. F. Joseph and J. S. Hancock. Chem. Soc.—Jl., vol. 125, Sept. 1924, pp. 1888-1895. Records composition of number of clays (principally soil clays), together with physical and chemical properties which appear correlated with composition.

Deposits. The Geology of Clay Deposits, M. W. Twitchell. Ceramist, vol. 4, no. 4, July 1924, pp. 211-228, 8 figs. Discusses formation of residual soils and clays, sedimentary clays; geology of New Jersey and its provinces.

Handling. See JETTIES, Clay-Cargo.

Kaolin. See KAOLIN.

Production, 1923. Clay in 1923. J. Middleton. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:9, Oct. 13, 1924, pp. 71-78. General conditions; production; production by uses; imports and exports.

Purification. Sedimentation as a Means of Purifying Clay, S. R. Hind. Ceramic Soc.—Trans., vol. 23, Pt. 3, 1923-24, pp. 234-252, 6 figs. Fundamental considerations, results of some laboratory tests, and methods of large-scale operation. Reprinted by permission of Brit. Refractories Research Assn., from Bull. no. 6, Apr. 1924.

Refractory. Refractory Clays and Shales of Indiana, W. N. Logan. Am. Ceramic Soc.—Jl., vol. 7, no. 3, Mar. 1924, pp. 201-206. Geographical distribution, physical and chemical properties, uses of refractory clays, and results of tests made, including cold crushing, slagging, transverse, and specific gravity tests and load tests under heat; physical properties and chemical composition of Chester shales.

See also REFRACTORIES, Clay.

Texture and Composition. The Relation of Texture and Composition of Clays, F. F. Grout. Am. Ceramic Soc.—Jl., vol. 7, no. 2, Feb. 1924, pp. 122-140. Determinations made with a view to finding distribution of common elements in portions obtained by mechanical separation of the several sizes of grains in a series of clays.

Washington. The Clays and Shales of Washington, Their Technology and Uses, H. Wilson. Univ. of Wash. Eng. Experiment Station,—Bul. no. 18, Oct. 1923, 224 pp., 105 figs. Geology of Washington clays; typical clays of state of Washington and comparison with several standard clays; results of tests on samples obtained during survey of the state, with statements of probable uses to which each clay can be put.

CLAY PRODUCTS

Casting. Practical Aspects in the Casting of Heavy Vitrified White Ware Products, C. C. Treiscel. Ceramist, vol. 4, no. 4, July 1924, pp. 204-211. Discusses raw materials, including ball clays, china clay and Kaolins, etc.; casting slips, pre-mixed and raw.

Drying. What You Should Know About Drying, W. E. Lemley. Brick & Clay Rec., vol. 64, no. 1, Jan. 8, 1924, pp. 26-29, 6 figs. Discussion of drying and drying methods, including description of dryers of Denny Renton Clay & Coal Co. From paper before Pacific Northwest Clay Workers' Assn.

Glass-House Pots. Some Notes on Pot-Clays and the Manufacture, Use and Treatment of Glass-house Pots, P. Marson. Soc. Glass Technology—Jl., vol. 8, no. 29, Mar. 1924, pp. 45-55 and (discussion) 55-57. Author's experiences with glass-house pots and pot-clay mixtures, presented with view of bringing glass manufacturers to realize some of the material factors and limitations which govern proper use of glass-house pots. Works tests for examining pot-clay mixtures and methods for obtaining greater efficiency in life of pots.

CLOCKS

Electric. A Superior Electric Pendulum; and Some Pendulum Equations, W. P. White. Optical Soc. of Am.—Jl., vol. 8, no. 6, June 1924, pp. 767-782, 5 figs. Attention called to great ease with which a very accurate clock pendulum of electric gravity type can be built. Simple equations given showing how design may be ordered to diminish recognized errors inherent in method of driving. These equations used to discuss value of this and other types of drive for pendulums of maximum accuracy, and indicate that electric gravity drive equals, and possibly excels, best of other types for such service.

Electric Clocks (Elektrische Uhren), H. Voigt. Praktische Maschinen-Konstrukteur, vol. 57, no. 38, Oct. 7, 1924, pp. 519-521, 9 figs. Principle and construction of electric clock centrals, and their operation.

Free Pendulum. The Free Pendulum, F. Hope-Jones. Roy. Soc. Arts—Jl., vol. 72, no. 3731, May 23, 1924, pp. 446-458 and, (discussion) 458-460, 9 figs. In explaining how it has been found possible to free pendulum altogether, author shows that it is neither desirable nor necessary to give frequent impulses, and that electrical time circuits of half-minute periodicity have contributed materially to breaking away from hide-bound custom.

CLOTH

Wear Testing. See FABRICS, Wear-Testing Machine.

CLUTCHES

Automatic Centrifugal. Automatic Centrifugal Clutches, H. Bentley. Am. Mach., vol. 61, no. 21, Nov. 20, 1924, p. 794. Designs and effects.

The Design and Operation of the Lancashire Automatic Centrifugal Clutch, H. Storar and W. P. Gladwell. Machy. (Lond.), vol. 25, no. 633, Nov. 13, 1924, pp. 193-200, 10 figs. Considerations in design; outputs; diameter of hub; thickness of driving arms; strength of rim; calculated outputs; lubrication.

Automobile. A New Flexible Coupling Device (Un nouveau dispositif d'accouplement flexible), E. Guilleaume. Industrie des Tramways, vol. 18, no. 205, Jan. 1924, pp. 11-14, 3 figs. Describes elastic device which is claimed to have many advantages over universal joint; gives results of tests and explains adaptation of this transmission to automobiles.

American Stock Clutch and Axle Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 446-450. Tabular data.

American Stock Clutch Specifications. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, p. 420. Specifications of different makes for busses, passanger cars, trucks, and tractors.

Conical. Conical Clutch Designs, A. Clegg, Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 867-869, 5 figs. Also Machy. (Lond.), vol. 24, no. 614, July 3, 1924, pp. 436-438, 5 figs. Advantages of conical clutches; construction of conical clutch for radial drilling machine; principles to be followed in design; conical clutch for lathe feed control and applied to planer drive.

Drums, Deformation of. Investigations of Deformation in Clutch Drums (Formänderungs-Untersuchungen an Kupplungstrommeln), G. Peneff. Maschinenbau, vol. 3, no. 15, May 8, 1924, pp. 517-520, 10 figs. Deformation tests on four different types of gear clutch drums of a benzol rail car; gives figures and diagrams which are of value in design and calculation of clutch drums.

Electrically Operated. Electrically-operated Clutches, M. H. Sabine. Machy. (Lond.), vol. 24, no. 602, Apr. 10, 1924, pp. 44-45, 7 figs. Improved design of solenoid clutch for use where control of power unit from distant position is required.

Föttinger. See MOTORSHIPS, Clutches.

Friction. Considerations in Clutch Design, A. Clegg. Machy. (Lond.), vol. 24, no. 612, June 19, 1924, pp. 363-367, 6 figs. Deals with friction clutches and expanding and contracting ring clutches.

Considerations in Friction Clutch Design, A. Clegg. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 669-670. Factors involved in design; allowable bearing pressures; calculating horsepower; types of friction clutches; single-plate, coil, and double-plate clutches.

Formulas and Data for Friction Clutches, Geo. W. Drake. Am. Mach., vol. 61, no. 25, Dec. 18, 1924, pp. 955-957, 4 figs. Formulas and data for cone, split-ring and disk friction clutches; practical examples of application of formulas.

Plate and Coil. Plate and Coil Clutches, A. Clegg. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 953-955, 6 figs. Also Machy. (Lond.), vol. 24, no. 619, Aug. 7, 1924, pp. 597-599, 6 figs. Notes on design. Describes different types.

Ring. Expanding and Contracting Ring Clutches, A. Clegg. Machy. (N. Y.), vol. 30, no. 10, June 1924, pp. 793-796, 6 figs. Expanding ring clutch with unusual adjustment; design operated by toggle levers; Johnson expanding ring clutch; contracting ring clutch.

COAL

Analyses. Analyses of Samples of Delivered Coal Collected From July 1, 1915 to January 1, 1922, With a Chapter on the Tidewater Pool Classifications, N. H. Snyder. U. S. Bur. Mines, Bul. 230, 1923, 156 pp. Essential data on coals listed.

Methods of Analysis of Coal. Fuel, vol. 3, nos. 12, 13 and 3, Jan., Feb., and Mar. 1924, pp. 27-30, 53-56, and 93-97, 3 figs. Interim report of Fuel Research Board. Jan.: Proximate and ultimate analysis. Feb.: Phosphorus in ash; caking index of coal; calorific value. Mar.: Laboratory low-temperature assay of coal; Lessing coking test of coal.

Analysis, X-Ray. The X-Ray Analysis of Coal, C. N. Kemp. Colliery Guardian, vol. 127, no. 3296, Feb. 29, 1924, pp. 539-541. Experiments on its scientific technical applications. From

paper read before North of England Inst. Min. & Mech. Engrs.

The X-Ray Analysis of Coal, and a New X-Ray Examining Unit, C. N. Kemp. Chem. & Industry, vol. 43, no. 29, July 18, 1924, pp. 234T-236T. Discusses X-ray methods available, including bombardment by suitable rays and observing effect, radioscopic and radiodensimetric examination, examination of elementary crystalline constituents.

X-Ray Analysis of Coal, With Scientific and Technical Applications, C. N. Kemp. Instn. Min. Engrs.—Trans., vol. 67, Pt. 1, Mar. 1924, pp. 59-81 and (discussion) 81-83, 20 figs. Review of earlier researches. Details of investigation of radioscopic, radiographic, stereoradiographic, and radiodensimetric methods.

Anthracite. See CARBON, Animal Constituents.

Anthracite, Ash Content of. Ash in Anthracite, O. P. Hood. U. S. Bur. Mines—Reports of Investigations, no. 2571, Feb. 1924, 2 pp. Results of tests made by Bur. of Mines on 127 samples of 1000 lb. each, representing nearly 30,000 tons of anthracite in dealers' yards in 17 cities in Massachusetts.

Anthracite, Origin of. The Origin of Anthracite, J. Roberts. S. Wales Inst. Engrs.—Proc., vol. 40, no. 2, May 8, 1924, pp. 97-138, 12 figs. and (discussion), nos. 3 and 4, Sept. 4 and Oct. 9, 1924, pp. 213-228 and 291-297. Evidence in support of contention that anthracite is a natural product of low-temperature carbonization, parent substance having consisted of bright coal, probably both clarain and vitrain, which has subsequently attained a temperature of between 500 deg. cent. and 550 deg. cent. in earth's crust.

Argentine Republic. Coal in Argentina (Los carbones argentinos), J. Rassmuss. Ingenieria, vol. 28, no. 7, July 1924, pp. 289-293. Discusses principal deposits, Gondwana coal, Mesozoic coal, and tertiary lignites, and gives analyses.

Artificial. See OIL, Hydrogenation.

Ash, Effect on Value. The Effect of Ash on the Practical Value of Coal, C. F. Wade. Fuel, vol. 3, no. 7, July 1924, pp. 261-262. Reviews result upon boiler efficiency produced by any ash in differing quantities and discusses effects of ash of varying compositions.

Ash, Fusing Point of. A Furnace for the Determination of the Fusing Point of Coal Ash, B. B. Kaplan. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 847-848, 2 figs. Describes gas and air furnace which attains a maximum temperature of 2700 deg. fahr.; experimental results.

Ash-Softening Temperatures. Ash Softening Temperatures and Clinkering of Coals in a Boiler Furnace, J. F. Barkley. U. S. Bur. Mines—Reports of Investigations, no. 2630, Aug. 1924, 3 pp. Comparison of ash-softening temperature of each coal, with clinkering tendencies of coal when burned in furnace; tabulation of proximate analyses, ash-softening temperatures and plant reports as to clinkering.

Australia. The Coal and Coal Burning Needs of Australia, F. M. Whyte. Combustion, vol. 11, no. 1, July 1924, pp. 61-63. The various factors of resources and markets affecting fuel situation in Australia.

Breakers. See COAL BREAKERS.

Briquetting. American Briquet Company's Lykens Plant, M. W. Orr. Modern Min., vol. 1, no. 4, Nov. 1924, pp. 96-100, 9 figs. Describes manufacture of briquets from culm pile to finished product aboard railroad cars.

Development of Briquetting Industry in the Ruhr (Die Entwickelung der Brikettindustrie im Ruhrgebiet), Philipp. Bergbau, vol. 37, nos. 17, 18, 19, 21, and 27, Aug. 21, Sept. 4, 18, Oct. 9, and Nov. 20, 1924, pp. 462-466, 501-506, 524-527, 580-582, and 691-698, 9 figs. Ruhr coal conditions; binders for briquetting; drying machines; different types of presses used.

Fuel Briquets in 1923, W. F. McKenney. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:5, Sept. 26, 1924, pp. 41-48, 3 figs. Production; value; distribution; raw materials and binders; briquetting plants in United States; world's production.

Improvements in Couffinhal and Egg Shape Briquet Presses (Neuerungen an Couffinhal- und Eiformbrikettpressen), M. Benedict. Feuerungstechnik, vol. 12, no. 20, July 15, 1924, pp. 167-169, 4 figs. Discusses production of coal briquets in form of cubes of 0.5 to 10 kg. weight or egg shape of various sizes, and presses used for purpose.

Notes on Coal Briquetting. Colliery Engr., vol. 1, no. 5, July 1924, pp. 212-213. Discusses steam consumption for process heating and power, proportion of coal, pitch and moisture, etc.

Plant in Newark Makes Briquets by Trent Process, F. H. Kneeland. Coal Age, vol. 26, no. 21, Nov. 20, 1924, pp. 715-716, 1 fig. Uses screenings and sweepings from anthracite yards; after pulverization coal is "amalgamated" with oil-forming pellets reducing ash over 60 per cent; "amalgam" is then briquetted; advantages and uses of product.

Small Briquettes Plant. Eng. Process, vol. 5, no. 8, Aug. 1924, pp. 153-154, 3 figs. Describes plant designed by Gröppel-Rheinmetall Aktiengesellschaft für Kohlenaufbereitungsanlagen of Bochum for producing egg-shaped briquets.

Brown. See LIGNITE.

By-Products Industry. Coal By-products Industry (L'Industrie des sous-produits de la houille), E. Langrogne and W. Boulin. Technique Moderne, vol. 16, no. 24, Dec. 15, 1924, pp. 837-849, 14 figs. Recovery of by-products in a modern coking plant; condensation of gas, ammonia recovery, benzol recovery, and treatment of sulphate of ammonia, coal tar and coke-oven gas. Bibliography.

Canadian Resources. Report of Institute Fuel Committee. Eng. Jl., vol. 7, no. 12, Dec. 1924, pp. 721-724. Data on sources, production, transportation, and distribution of fuels; bituminous or sub-bituminous coals for domestic heating; bituminous coal for power purposes; coke.

Carbonization. A New Process of Low-Temperature Carbonization for Refining Coal (Ein neuartiges Schwelverfahren zur Veredelung von Kohle), C. Redzich. Wärme- u. Kälte-Technik, vol. 26, no. 23, Dec. 1, 1924, pp. 213-216. Design and construction of Meguin furnace, a vertical rotary furnace in which by careful treatment of coal a thin liquid primary tar and a semi-coke of greater density are obtained, due to use of centrifugal force.

A Study of Some Physical Laws Governing the Carbonization of Coal, A. W. Warner. Gas Jl., vol. 165, nos. 3165 and 3166, Jan. 9 and 16, 1924, pp. 90-91 and 147-148, 1 fig. Discusses five basic laws governing carbonization deduced from experiments with apparatus devised to show how a fourth fundamental process can be applied to carbonization of coking coal. From committee report submitted at 1923 convention of Am. Gas Assn.

Carbonization, W. B. Davidson. Gas Jl., vol. 167, nos. 3194, 3195, and 3196, July 30, Aug. 6, and 13, 1924, pp. 447-448, 515-516, and 580-581. Endeavors to set out briefly and clearly main accomplishments of research work on carbonization described in three Cantor lectures by E. V. Evans (Study of Destructive Distillation of Coal.)

Carbonizing Coal With Regenerated Heat, C. H. S. Tupholme. Chem. & Met. Eng., vol. 31, no. 10, Sept. 8, 1924, pp. 388-389, 1 fig. Description of new type of plant for complete gasification of coal, in which fuel is converted into gas in a single operation, leaving ash, liquor, and tar as residuals, in such a way that a large proportion of potential energy of coal is available as city gas.

Carbonizing in Continuous-Intermittent Retorts, F. Shewring. Gas Wld., vol. 81, no. 2108, Dec. 13, 1924, pp. 582-585 (includes discussion), 5 figs. See also Gas Jl., vol. 168, no. 3212, Dec. 3, 1924, pp. 653-656 (includes discussion), 5 figs. Description of plant which is continuous in gas manufacture and intermittent in coal feed and coke discharge. Coke production, gas production, working results, fuel consumption, etc.

Cast-Iron Retorts for Low-Temperature Carbonization, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 12, Mar. 24, 1924, pp. 471-473, 2 figs. Describes Tozer system designed to permit carbonization at moderate temperature and in short time.

Coal Carbonisation, J. Roberts. Colliery Eng., vol. 1, nos. 7, 8, and 10, Sept., Oct., and Dec. 1924, pp. 305-308, 357-359 and 470-472 and 475, 9 figs. Considers rationale of coking and non-coking coals, their classification and behavior during carbonization. Principles of carbonization. Low-temperature carbonization.

Extraction of Coal by Solvents, P. N. Lategan. S. African Jl. of Industries, vol. 7, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 41-46, 103-108, and 152-160. Low-temperature carbonization experiments with nine samples of South African coals. Jan.: Method; experimental apparatus; description of products. Feb.: Thermal decomposition of coal at 600 deg. cent.; semi-coke (smokeless fuel); low-temperature gas and its composition. Mar.: Tar oils; light spirit, alcohol, and benzol mixtures.

Extraction of Primary Tar and Crude Oils From Coal, Lignite, Etc., by Low-Temperature Carbonization (Extraction du goudron primaire et des huiles brutes, à partir des charbons gras, lignites, etc., par carbonisation à basse température), C. Berthélot. Génie Civil, vol. 85, nos. 10, 11, and 12, Sept. 6, 13, and 20, 1924, pp. 209-213, 230-233, and 251-254, 8 figs. Discusses technical difficulties; modern views; oil yields of lignites, coal, oil shales; field of application of low-temperature carbonization; processes for conversion of primary tars; etc.

Future Prospects of Low Temperature Carbonization, S. W. Parr. Gas Age-Rec., vol. 54, no. 21, Nov. 22, 1924, pp. 733-734 and 756. Review of present-day situation, and future aspects.

Graded Temperature Zones in Coal Carbonization, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 2, Jan. 14, 1924, pp. 54-55, 2 figs. Automatic temperature control is worth attention because of its use here and its possibilities for other applications.

Low Temperature Carbonization, A. McCulloch. Chem. & Industry, vol. 43, no. 11, Mar. 14, 1924, pp. 271-273. Need for smokeless fuel, suitable particularly for domestic purposes; difficulties encountered in producing such fuel from bituminous coal; progress made in this direction, and future of low-carbonization industry.

Low-Temperature Carbonization, A. McCulloch. Chem. Trade Jl., vol. 74, no. 1918, Feb. 22, 1924, pp. 220-221. Technical and economic problems still to be solved.

Low-Temperature Carbonization, C. H. Lander. Iron & Coal Trades Rev., vol. 109, no. 2940, July 4, 1924, pp. 9-10. See also Gas Jl., vol. 168, no. 3212, Dec. 3, 1924, pp. 659-661. There are two distinct lines whereby problem of low-temperature carbonization may be attacked, differentiation being according to method whereby heat is supplied to coal under treatment. Gives two methods of carbonizing coal. (Abstract).

Low Temperature Carbonization, D. Brownlie. Combustion, vol. 11, no. 5, Nov. 1924, pp. 354-359, 8 figs. Richards-Pringle process.

Low Temperature Carbonization. Combustion, vol. 10, no. 6, Dec. 1924, pp. 428-429 and 437. Opinions on its importance and future possibilities.

Low-Temperature Carbonisation and the Need for a National Scientific Policy, D. Brownlie. Chem. & Industry, vol. 43, no. 1, Jan. 4, 1924, pp. 2-4. Points out national importance of process.

Low Temperature Carbonisation, as Applied to Fuel Problems in Japan, Kwan-ichi Omori. Fuel, vol. 3, no. 10, Oct. 1924, pp. 360-366. Classification of processes; fuel problems in Japan; development of low-carbonization processes; present aspect.

Low-Temperature Carbonization of Coal, C. M. Garland. Power, vol. 60, no. 13, Sept. 23, 1924, pp. 490-493, 2 figs. Coal coked evenly and continuously by superheated steam at one pound pressure generated from volatile and residue of coking process. Including fixed charges on investment, cost of treating coal containing 5 per cent moisture is estimated at 80 cents per ton.

Modern Methods of Coal Carbonization, Rob. Gray. Gas World, vol. 80, no. 2069, Mar. 15, 1924, pp. 234-237; also in Gas Jl., vol. 165, no. 3175, Mar. 19, 1924, pp. 713-715. Construction of horizontal and vertical retorts; process of distillation in horizontals; decomposition of ammonia; comparison of tar from horizontal and vertical retorts; volatile products; Mond plant; calorific value and vertical retorts; water-gas plant. (Abstract.) Paper before West. District of Scottish Junior Gas Assn.

Notes on Carbonizing Temperatures, W. H. Warren. Gas Wld., vol. 81, no. 2106, Nov. 29, 1924, pp. 534-536 (includes discussion). See also Gas Jl., vol. 168, no. 3212, Dec. 3, 1924, pp. 649-651. Advantages an disadvantages of high combustion temperatures. Comparative working results obtained from retort houses using various combustion temperatures.

Practical Coal Carbonization, A. R. Powell. Mech. Eng., vol. 46, no. 7, July 1924, pp. 389-394, 6 figs. See also (abstract) Univ. Engr., vol. 40, no. 4, Oct. 1924, pp. 25-33, 6 figs. Enumeration of technical problems of low-temperature carbonization and classification and description of the various processes.

Practical Coal Carbonization, F. W. Sperr, Jr. Mech. Eng., vol. 46, no. 6, June 1924, pp. 329-333, 4 figs. Also Universal Engr., vol. 40, no. 2, Aug. 1924, pp. 31-37, 4 figs.; and Chem. Age (N. Y.), vol. 32, nos. 6 and 7, June and July 1924, pp. 277-279 and 297-299, 4 figs. Discusses high-temperature and low-temperature carbonization with special reference to American conditions; yields and values of by-products; coke as boiler fuel.

Recovery of Materials From Fuels in Power Plants (Die Gewinnung von Wertstoffen aus dem Brennstoff in Kraftbetriebe), Pradel. Braunkohle, vol. 23, nos. 35 and 36, Nov. 29 and Dec. 6, 1924, pp. 645-648 and 671-675, 22 figs. Reviews patents on low-temperature carbonization on grates, in retorts, and in shafts, giving details of design and operation.

Report of the Low Temperature Carbonization Section (Am. Gas Assn.), S. W. Parr. Am. Gas Jl. (daily edition), vol. 121, no. 19, Oct. 17, 1924, pp. 1079-1080. Gives latest developments in field.

Selection, Preparation and Carbonization of Coal and Preparation of Coke, A. W. Grant, Jr. Am. Gas Jl. (daily edition), vol. 121, no. 18, Oct. 16, 1924, pp. 1038-1040. Ash and sulphur contents and agglutinating values as reflected by transition of size of coal; pulverization; cementing materials in coal; coke degradation; advantages of high-temperature carbonization; coke quenching and handling.

Smokeless Fuel. Chem. & Industry, vol. 43, no. 35, Aug. 29, 1924, p. 874. Principles of pure coal briquet carbonization process.

Standard Carbonizing Plant Test Code, D. W. Wilson. Am. Gas Jl. (daily edition), vol. 121, no. 19, Oct. 17, 1924, p. 1077. Committee report, giving detailed forms.

Summary of British Low-Temperature Carbonizing Methods, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 26, June 30, 1924, p. 1019. Present trends and future prospects.

Test Results from Low Temperature Carbonization, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 10, Mar. 10, 1924, p. 397. Further experiences with Maclaurin plant at Dalmarnock, Scotland, show more fully what may be expected from this plant.

Tests of Run-of-Mine versus Three-quarters Inch Coal for Carbonization, F. D. Lohr and A. M. Beebe. Am. Gas Jl. (daily edition), vol. 121, no. 19, Oct. 17, 1924, pp. 1075-1077. Results of plant tests and conclusions.

The Carbonization of Coal (La carbonisation de la houille), E. Audibert. Technique Moderne, vol. 16, no. 3, Feb. 1, 1924, pp. 77-82. Discusses problems which have been subject of research and conclusions arrived at; notes on coking coal; carbonization of dry coal; blast-furnace coke, reactivity of coke and its influence on efficiency of blast furnace; valuation of by-products.

The Carbonisation of Coal in the Form of Fine Particles, H. E. Newall and F. S. Sinnatt. Fuel, vol. 3, no. 12, Dec. 1924, pp. 424-434, 11 figs. Production of cenospheres; describes phenomena observed when coal in form of fine particles is allowed to fall into inert atmosphere maintained at definite temperature.

The Low Temperature Carbonization of Coal. Petroleum Times, vol. 12, no. 304, Nov. 1, 1924, pp. 691-693, 1 fig. British government test on Parker plant installed at Barnsley.

The Maclaurin Process of Producing Smokeless Fuel, R. Sturrock. Gas World, vol. 80, no. 2061, Jan. 19, 1924, p. 52. Notes on Maclaurin process of low-temperature carbonization for production of a smokeless solid fuel, and results of tests made for Glasgow Corpn. Gas Dept. Extract from paper read before Scottish Jr. Gas Assn.

The Parker Low-Temperature Carbonisation Plant. Engineering, vol. 118, no. 3069, Oct. 24, 1924, pp. 588-589, 3 figs. Details of plant erected at Barugh works of Low-Temperature Carbonisation, Ltd., consisting of two settings, each of 32 retorts; results of test.

The Physics of the Coking Time. Gas Wld., vol. 81, no. 2107, Dec. 6, 1924, pp. 12-13 (Coking Sec.). Survey of factors influencing period of carbonization.

Thermal Reactions of Coal During Carbonization. J. D. Davis and P. B. Place. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 589-592, 4 figs. Discusses thermal behavior of coals during carbonization and compares methods applicable to determination of reaction heats; heat-rate method originally used by Hollings and Cobb for investigating reaction heats of English coals has been applied with slight modification to seven typical American coals and sample of pine sawdust, and attempt made to compare results with those found by direct determination in constant-volume calorimeter; results indicate that for high temperatures prevailing in coke-oven operations reaction heats are endothermic.

To Abolish the Burning of Raw Coal, D. Brownlie. Colliery Engr., vol. 1, no. 6, Aug. 1924, pp. 287-292, 1 fig. Review of present position of low-temperature carbonization and some constructive proposals; describes various processes.

Using a Modified Mond Producer for Low-Temperature Carbonization, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 7, Feb. 18, 1924, pp. 271-273, 2 figs. Process changed to produce richer gas and more tar, with increased overall thermal efficiency.

Using Internal Heating for Low-Temperature Carbonization, C. H. S. Tupholme. Chem. & Met. Eng., vol. 30, no. 22, June 2, 1924, pp. 861-863. Account of several important processes.

See FUELS, Research.

Carbonization By-Products as Power Sources. The Liquid By-Products of Coal Corbonization as Sources of Power, W. G. Adam. Gas Jl., vol. 167, no. 3191, July 9, 1924, pp. 254-255. See also Gas Wld., vol. 81, no. 2086, July 12, 1924, pp. 40-42, and Iron & Coal Trades Rev., vol. 119, no. 2940, July 4, 1924, pp. 10-11. Liquid organic or oil by-products; use of silica gel and charcoal; gum-forming compounds; problems for future. Extracts from World Power Conference paper.

Carbonizing Plant. New Coal Carbonizing Plant at Danbury, Conn. Gas Age-Rec., vol. 54, no. 15, Oct. 11, 1924, pp. 505-508, 5 figs. Plant is of horizontal gas-oven type.

Chemical Constitution. See FUELS, Solid, Chemical Constitution.

Classification. Classification of Coal That Will Enable Buyer to Know What Kind of Fuel He Is Getting, Geo. H. Ashley. Coal Age, vol. 25, no. 5, Jan. 31, 1924, pp. 167-171, 1 fig. See also Coal Mine Mgmt., vol. 3, no. 1, Jan. 1924, pp. 29-31 and 56-61. Suggests that coals be divided into ten classes by percentages of fixed carbon with ash equated to 7 per cent; seven new classes added to recognized divisions; graded also for quality.

Classification of Coal With Special Reference to Capacity for Coking (Beitrag zur Klassifikation der Steinkohle mit besonderer Berücksichtigung ihres Kokungsvermögens), S. Qvarfort. Gas- u. Wasserfach, vol. 67, no. 48, Nov. 29, 1924, 1924, pp. 728-730, 11 figs. Details of method for readily determining properties of coals, or for identifying coals, especially their coking properties.

Contribution to the Classification of Coal With Special Reference to Its Coking Qualities (Bidrag til klassifikationen av stenkol med särskild hänsyn taken till deras koksningsförmåga), S. Qvarfort. Teknisk Tidskrift, vol. 54, no. 15, Apr. 12, 1924, pp. 25-30 (Kemi), 15 figs. Method for testing coking qualities of a coal sample is described and, on basis of test, coal is classified as belonging to one of the nine different classes, defined by author. Advantageous use of such tests for gas works.

The Chemical Classification of Coal, C. A. Seyler. Fuel, vol. 3, nos. 1, 2, and 3, Jan., Feb. and Mar., 1924, pp. 15-26, 41-49 and 79-83, 4 figs. Author proposes nomenclature which was devised to disturb existing terminology as little as possible.

Cleaning. Cleaning Coal with Spiral Separators and Concentrator Tables. Gas Engr., vol. 40, no. 580, Aug. 1924, pp. 176-177, 2 figs. Spiral separator consists of central post with number of separating threads running spirally from top to

bottom and slightly inclined towards center, down which coal and stone slide under action of gravity; for dealing with coal below ⅜ in. in size H-H concentrator table is used; sole driving mechanism for this table consists of single unbalanced pulley carried on shaft which is clamped fast to heavy yoke at head end of shaking frame.

Concentrating Tables—Their Operation and What Results They Obtain in Cleaning Anthracite, J. Griffin. Coal Age, vol. 26, no. 7, Aug. 14, 1924, pp. 217-219, 4 figs. Used first eight years ago. Clean sizes up to pea. Clinkering eliminated; less ash after burning; reduced labor; increased boiler capacity; regulatable ash content.

Dry Cleaning of Coal, R. W. Arms. Am. Inst. Min. & Met. Engrs.—Trans., no. 1330-C, Mar. 1924, 9 pp. Classification of dry-cleaning devices, with theoretical discussion of principles involved; outline of methods of handling dust and screening difficulties at McComas plant, and other plants; describes American pneumatic separator and discusses sizing required, effect of moisture in raw coal, disposition of middlings, and other aspects of process; results of tests on various coals, and results of operation at Raton and McComas.

Dry Cleaning of Nut, Pea and Slack Coal, R. W. Arms. Coal Mine Mgmt., vol. 3, no. 1, Jan. 1924, pp. 53-54. Describes pneumatic separators.

Dry Cleaning Plant of the Greenhill Mine of the West Canadian Collieries, Limited, Blairmore, Alberta, G. A. Vissac. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 643-653, 2 figs. Deals particularly with economic side of coal washing; discusses why dry-cleaning process was selected and describes plant.

How to Clean and Size Coal So That a Favorable Market Can Be Maintained. Coal Age, vol. 25, no. 21, May 22, 1924, pp. 761-764, 10 figs. By air cleaning, ash is reduced between 33 to 50 per cent; coal gets to market unfrozen; what coal should be sized in tipple and what in rescreen. Discussion at meeting on coal preparation at Am. Min. Congress. See also article by G. F. Osler entitled, How Should Coal Be Screened and into How Many Sizes?, pp. 762-764.

Pneumatic Coal Separation, Wm. J. O'Toole. Coal Mine Mgmt., vol. 3, no. 12, Dec. 1924, pp. 36-41, 2 figs. Details of American pneumatic separator and installations of this device; sizing and dust collecting.

Swastika Dry Coal Cleaning Plant, F. Young. Ariz. Min. Jl., vol. 7, no. 19, Mar. 1, 1924, pp. 5-6 and 38, 1 fig. Description of dry process coal cleaning plant built and operated by St. Louis, Rocky Mt. & Pacific Co. (Swastika Fuel Co., distributors) at its mines at Brilliant, New Mexico, and special machinery used in this process.

The Dry Cleaning Process for Coal Min. Congress Jl., vol. 10, no. 7, July 1924, pp. 311-314, 2 figs. Recent developments in equipment; description of Paint Creek Coal Co.'s plant; primary vs. secondary preparation; cost of process; its advantages and disadvantages.

The Improvement of Coal by Mechanical or Thermal Methods of Treatment, J. B. B. Kershaw. Fuel, vol. 3, nos. 5, 6, and 7, May, June, and July 1924, pp. 165-170, 189-195, 249-253, 12 figs. Methods of removing impurities from small coal and from all kinds of washery waste and pit refuse, namely, (1) hydraulic or wet methods; (2) methods involving use of oil; (3) electrostatic and other dry methods; (4) methods involving use of heat.

The Wyco Dry Cleaning Plant, R. W. Arms. Coal Industry, vol. 7, no. 4, Apr. 1924, p. 163. See also Coal Age, vol. 25, no. 12, Mar. 20, 1924, pp. 421-422, 2 figs. Design and methods at plant built for Wyoming Coal Co. in W. Va., using American pneumatic separators.

What Anthracite Region Is Doing to Make Fine Sizes of Coal More Readily Salable, F. H. Kneeland. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 673-675, 5 figs. Jigging, tabling, and floating are cleaning processes in use; jigs now operate without suction and stratification occurs in quiescent liquid.

See also COAL WASHING.

Coking. Effect of Oxygen of Coal in Coking (Der Einfluss des Sauerstoffs der Kohle bei der Verkokung), A Thau and Trutnovsky. Glückauf, vol. 60, no. 41, Oct. 11, 1924, pp. 925-928. Discusses theory of Roberts, an American, that in coking we have to count with available oxygen, and that oxygen does not combine with hydrogen to water, leaving an excess of oxygen.

Combustion Power Determination. Determining the "Combustion Power" of Coal, M. Nicloux. Am. Gas Jl., vol. 120, no. 7, Feb. 16, 1924, pp. 137-139 and 151-152. What this means, and description of methods and apparatus. Translated from Chimie & Industrie.

Conservation, Railways. Coal Conservation, A. J. Law. Southern & Southwestern Ry. Club, vol. 17, no. 9, May 1924, pp. 23-24, 27-28, 31-32, 35-36, 39-40 and (discussion) 40, 43-44, 47-48 and 51-53. Points out measures which may be taken to save coal with only reasonable expenditure of money.

Constitution. The Constitution of Coal, Marie C. Stopes and R. V. Wheeler. Serial article in Fuel, beginning Jan. and ending Nov. 1924, 20 figs. Definition of coal; constitution; mode of accumulation of coal-forming materials; action of solvents; destructive distillation; initial decomposition; distillation at different temperatures; sulphur and nitrogen compounds; microscopical evidence bearing on constitution; opinions and observations of present research; ulmin compounds; action of reagents; artificial coal; theories. See also bibliography in no. 12, Dec. 1924, pp. 439-452.

Control Plan. Will This Solve America's Coal Problems? O. M. Fox. Ry. Jl., vol. 30, no. 1, Jan. 1924, pp. 29-33, 7 figs. Describes and analyzes Indiana plan of control; purports to eliminate over-production and over-manning, to stabilize prices and insure steady supply; would lighten burden of railways.

Crushing. The Primary Reduction of Coal. Gas & Oil Power, vol. 20, no. 231, Dec. 4, 1924, pp. 47-49, 4 figs. Crushing coal for use on automatic stokers or for further treatment in pulverizer mills; gyratory crushers; intermittent crushing; single toggle breaker; single roll crusher; swing hammer pulverizer.

Deposits. See COAL DEPOSITS.

Distillation. A Study of the Destructive Distillation of Coal, E. V. Evans. Roy. Soc. Arts—Jl., vol. 72, nos. 3749 and 3750, Sept. 26 and Oct. 3, 1924, pp. 767-782 and 785-801, 26 figs. See also Gas Jl., vol. 165, nos. 3172, 3173, and 3174, Feb. 29, Mar. 5 and 12, 1924, pp. 483-488, 15 figs.; 550-559, 11 figs.; and 629-634, 6 figs.; and Gas World, vol. 80, nos. 2067, 2068, and 2069, Mar. 1, 8 and 15, 1924, pp. 170-176, 13 figs.; 197-207, 11 figs.; and 228-234, 6 figs. New interpretation of therm; distribution of therms in high- and low-temperature process; prevention of therm wastage; therm yield and efficiency. Mar. 5: Volatile therms; rate of carbonization in relation to yields of gas and tar therms; constitution of primary tar; cracking of primary and secondary tars; economic considerations. Mar. 12: Physical behavior of coal under heat; increasing conductivity of coal; results of admixture of inert material; briquette carbonization; de-ashing of coal. Three Cantor lectures delivered before Roy. Soc. Arts.

A Successful Low Temperature Distillation Process, H. Holzwarth. Coal Industry, vol. 7, no. 3, Mar. 1924, pp. 112-115, 5 figs. Thyssen system, recently introduced in United States, has been in successful use for some years; expected to prove of value; illustrations of Thyssen kilns in Germany, and how they work.

Latest Progress in Coal Distillation and Derived Industries (Ultimos progresos obtenidos en la destilacion del carbon y en las industrias derivadas), L. Toron. Revista Minera Metalúrgica y de Ingenieria, vol. 75, nos. 2943 and 2944, Sept. 8 and 16, 1924, pp. 509-511 and 528-533, 2 figs. Discusses general improvement in distillation, crude combustibles, production of gas, coking furnaces, by-product recovery, tar, ammonia.

Low-Temperature Distillation, H. Nielsen. Gas Jl., vol. 168, no. 3209, Nov. 12, 1924, pp. 434-438, 4 figs. See also Chem. Trade Jl. and Chem. Engr., vol. 75, no. 1955, Nov. 7, 1924, pp. 549-551. Important points in regard to low-temperature carbonization; "L & N" process; briquetting; gas for furnaces. (Abstract.) Paper read at Manchester Smoke Abatement Conference.

Low-Temperature Distillation of Coal and the Question of Motor Fuel and Lubricating Oil (La distillation des carbons a basse température et la question du carburant et du lubrifiant nationaux), H. Havre. Société Industrielle de l'Est—Bul., no. 173, Apr.-May-June 1924, pp. 69-85, 7 figs. Discusses French situation, production of gas, tar and coke and its influence on carbonization methods, low-temperature distilling apparatus of various types.

Low-Temperature Distillation of Farmville, N. C., Coal, W. E. Giles and F. C. Vilbrandt. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 779-782, 2 figs. Low-temperature distillation study indicates that this excessively smoky and high-volatile coal can be converted into commercial gas and low-volatile residue suitable for domestic consumption.

Mondello Process for Distilling Fossil Fuel (Il processo Mondello per la distillazione dei combustibili fossili), G. Gastelli. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 2, Aug. 15, 1924, pp. 40-43. Details of new process by U. and P. A. Mondello based on principle of condensation with rapid lowering of temperature enabling recovery of primary tar, heavy oils, and medium-light oils.

Where Low Temperature Distillation Stands, C. H. S. Tupholme. Combustion, vol. 10, no. 1, Jan. 1924, pp. 57-59. Discussion of present status of low-temperature coal distillation, particularly in Great Britain. Author predicts that in near future we shall see low-temperature distillation standing not as a separate industry but in coöperation with those industries which employ power in any form.

See also Carbonization.

Distillation Products. Coal Distillation Products, Coke Oven Installations and Recovery Plants of the Société Normande de Métallurgie at Caen (Les produits de la distillation de la houille, installations des fours à coke et des usines de récupération de la Société normande de Métallurgie, à Caen), A. Grebel. Génie Civil, vol. 84, no. 25, June 21, 1924, pp. 585-593, 15 figs. Describes blast furnaces and steel plants, stock and preparation of coal, coke ovens, benzol treatment, tar distillation, etc.

Dry Cleaning. See Cleaning.

Drying. Notes on Coal Drying. Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 99-102, 2 figs. Brief descriptions of drying machines suited to both preliminary and final stages of preparation of pulverized coal and for other purposes.

Fusain, Analyses of. Analyses of Fusain, A. E. Beet. Fuel, vol. 3, no. 11, Nov. 1924, pp. 390-392. Data regarding properties.

Gasification. Complete Gasification of Coal, H. Strache. Gas Wld., vol. 81, no. 2091, Aug. 16, 1924, pp. 161-162, 2 figs. Also Colliery Guardian, vol. 123, no. 3321, Aug. 22, 1924, p. 483, 1 fig. Deals with double-gas (gas made by alternately blowing air and steam through heated coal in producer); use of coal in producer instead of coke distinguishes double-gas from water gas. Abstract of paper read at World Power Conference.

Further Experiences in Complete Gasification, F. H. Robinson. Gas Jl., vol. 167, no. 3202, Sept. 24, 1924, pp. 927-931, 6 figs. Description of system employed at Harrogate; heating balance; working costs; comparison of costs with horizontals.

The Regenerative Coal Gasification System at Aylesbury, A. G. Lane. Gas Jl., vol. 167, no. 3190, July 2, 1924, pp. 149-153, 3 figs. Also Gas Engr., vol. 40, no. 579, July 1924, pp. 151-152; and Gas Age-Rec., vol. 54, no. 6, Aug. 9, 1924, pp. 177-180, 2 figs. In this process of complete gasification coal is transformed into gas in single operation, leaving only ash, liquor, and tar as residuals, and in such manner as to render very large proportion of energy of coal available and salable as town's gas.

See also Carbonization.

Heat, Effect on. Quantity and Nature of Gas Evolved by Solid Fuels under the Action of Heat or of a Vacuum: Coals (Sur la quantité et la nature des gaz dégagés par les combustibles solides sous l'action de la chaleur et du vide: Houilles), P. Lebeau. Académie des Sciences—Comptes Rendus, vol. 178, no. 4, Jan. 21, 1924, pp. 391-393. Study of effect of heat on ten different kinds of coal; gaseous evolution in all cases becomes rapid at 400 deg. (1 to 5 cu.m. per metric ton); most coals give, per metric ton, 15 kg. of hydrogen, anthracite giving 25 kg.

Heating Value. A Graphic Method of Calculating the Lower Heating Value of Coal with Varying Water Content (Ein graphisches Verfahren zur Berechnung des unteren Heizwertes von Kohle bei verschiedenem Wassergehalt), H. Wegener. Brennstoff- u. Wärmewirtschaft, vol. 6, no. 9, Sept. 1924, pp. 193-195, 2 figs. Graphic method with which it is possible to determine very quickly and with sufficient accuracy lower heating value of moisture-free coal.

Loss of Heating Value of Bituminous Coal on Exposure to Air, J. F. Byrne and J. D. Davis. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 775-778, 5 figs. Method and results of determination of loss in heating value of coal on exposure to air.

The Calorific Values of Coals, with Special Reference to the Coals of Nottinghamshire and Derbyshire, J. W. Whitaker. Instn. Min. Engrs.—Trans., vol. 67, pt. 2, May 1924, pp. 199-221, 7 figs. Also Colliery Guardian, vol. 127, no. 3299, Mar. 21, 1924, pp. 734-737, 6 figs; and Iron & Coal Trades Rev., vol. 108, no. 2924, Mar. 14, 1924, pp. 427-428, 1 fig. Results of analyses and calorific values of 38 samples of coal.

Hydrocarbons from. See HYDROCARBONS, Coal Conversion into.

Ignition. The Ignition of Coal, R. V. Wheeler. Fuel, vol. 3, no. 10, Oct. 1924, pp. 366-370, 5 figs. Tests to determine what relationship, if any, there is between chemical composition of coal and its ignition temperature; it is concluded that reaction responsible for "self-heating" of coal is mainly one of attachment of oxygen to molecules of high carbon content.

Low-Ash Coking. Producing Low-Ash Coking Coal, H. M. Chance. Iron Trade Rev., vol. 75.

no. 3, Jan. 17, 1924, p. 236. Differential separation affords possibility of obtaining desirable fuel from impure high-ash coal which is available in large quantity in many mining districts; first tried in anthracite field.

Low-Grade and Waste. The Utilisation of Low-Grade and Waste Coals in Power Production, W. S. Coates. Chem. & Industry, vol. 43, no. 21, May 23, 1924, pp. 157T-163T, 5 figs. Notes on furnace design; combustion of carbon in coke; boiler; pulverized fuel.

Low-Temperature Carbonization. See Carbonization.

Measurement by Volume. Coal Measurement by Volume versus Measurement by Weight, J. E. Lea. Eng. & Boiler House Rev., vol. 37, no. 6, Jan. 1924, pp. 194 and 196, 2 figs. Merits of measurement by volume.

Microscopic Examination. Microscopic Examination of Coal (Die mikroskipische Untersuchung der Kohle im auffallenden Licht), H. Winter. Braunkohle, vol. 23, no. 33, Nov. 15, 1924, pp. 605-613, 16 figs. Discusses examination of non-transparent minerals in light falling onto them, without or with slides, and reviews literature on subject.

Mines. See COAL MINES.

Mining. See COAL MINING.

Moisture in. Analytical Fuel Investigation. I. Practical Determination of Water Content in Coal (Brennstoffanalytische Untersuchungen. I. Die Bestimmung des Wassergehaltes der Steinkohle für praktische Zwecke), C. Blacher and G. Girgensohn. Chemiker-Zeitung, vol. 48, no. 65, May 29, 1924, pp. 357-359. Describes various methods and criticizes their results.

Apparatus for the Automatic Determination of Water in Coal, Tar and Oil (Ein automatischer Wasserbestimmungsapparat für die Untersuchung von Kohle, Teer und Oel), K. Schaefer. Chemiker Zeitung, vol. 48, no. 125, Oct. 16, 1924, p. 761, 1 fig. By use of different receivers in same apparatus determination can be made on materials containing varying amounts of water; apparatus consists of round-bottomed flask, containing material and zylene, fitted with ground-glass stopper through which passes distillation tube.

Moisture in Coal, W. S. Patterson. Power Engr., vol. 19, no. 222, Sept. 1924, pp. 329-330. Discusses boiler efficiency and wet coal, moisture and flue gas, moisture and economizer corrosion, moisture and spontaneous combustion, and appearance of wet coal.

Normal Water Content of Coal and Coke (Het normale Watergehalte van steenkool en cokes), N. Schoorl. Chemisch Weekblad, vol. 21, no. 1091, Aug. 23, 1924, pp. 393-395, 1 fig. Large number of samples, after exposure to atmospheres of varying degrees of humidity until weights were constant, were examined for water content, and results plotted on curves connecting water content and degree of humidity; forms and positions of curves show no relation to composition or calorific value of fuels.

Nitrogen Estimation. The Estimation of Nitrogen in Coal, A. Baranov and R. A. Mott. Fuel, vol. 3, nos. 12 and 13. Jan. and Feb. 1924, pp. 31-34 and 49-52, 1 fig. From this study of different methods of determining nitrogen in coal it appears that particular modification of Kjeldahl method chosen by Fuel Research Board is most accurate.

The Estimation of Nitrogen in Coal, W Donovan. Analyst, vol. 49, no. 575, Feb. 1924, pp. 57-61 and (discussion) 62. Nitrogen was estimated in five coals by Dumas method and in same coals by Kjeldahl-Gunning process; latter results, plus 0.2 per cent, would give correct percentage of nitrogen in coals examined.

The Estimation of Nitrogen in Coal and Coke, G. E. Foxwell. Gas World, vol. 80, no. 2059, Jan. 5, 1924, pp. 12-14. Methods generally used; Kjeldahl method not reliable; Dumas' method; modifications of Dumas test; making Kjeldahl test reliable.

Oil from. See OIL, Production from Coal.

Oxidation. Silver-sulphochromic Oxidation of Coal (Oxydation argentosulfochromique de la houille), L. J. Simon. Académie des Sciences—Comptes Rendus, vol. 178, no. 9, Feb. 25, 1924, pp. 775-777. When coal is heated with mixture of silver bichromate and concentrated sulphuric acid at 100 deg., 4 to 5 per cent of carbon present remains unoxidized; formation of gaseous oxidation products is more rapid at 50 than at 60 deg., at which temperature 28 per cent of coal remains unchanged; it is concluded that coal contains two constituents intimately mixed: one is oxidized at low temperatures; other, like coke, requires temperature of 100 per cent.

Sulphochromic Oxidation of Coal (Sur l'oxydation sulfochromique de la houille), L. J. Simon. Académie des Sciences—Comptes Rendus, vol. 178, no. 5, Jan. 28, 1924, pp. 495-498. Sulphochromic oxidation of finely ground coal containing 72.4-72.3 per cent of carbon gives 78 per cent of carbon present as CO_2, remainder being obtained partly as insoluble, partly as soluble, carbonaceous matter; prolonged oxidation by same method at 100 deg. causes evolution of oxygen (together with CO and CO_2).

Oxygen Estimation. The Estimation of Oxygen in Coal, G. E. Foxwell. Gas World, vol. 80, no. 2063, Feb. 2, 1924, pp. 11-12. Proposes methods.

Pennsylvania. Coal Reserves in Pennsylvania, J. D. Sisler. Pennsylvania Topographic & Geologic Surv. Bul. nos. 81 and 85, Nov. 1 and Mar. 20, 1924, 10 and 11 pp. respectively. Two bulletins giving tables of estimated quantity of coal in original deposit, quantity mined out and lost, and quantity recoverable in each township, workable area of each township, and summary of resources by beds, Bul. no. 81 dealing with Clarion County and Bul. no. 85 with Jefferson County.

Volatile Matter in Pennsylvania Coals, J. D. Sisler. Pennsylvania Topographic & Geologic Surv. Bul. no. 81, Nov. 1, 1923, 11 pp., 1 fig. Discusses problem of volatile matter, and shows relation of oil and gas pools to volatile matter in Pennsylvania coals, and use of coals from different districts; shows graphically relation of folding, faulting, and movement to chemical character of coals.

Phosphorus in. Phosphorus in Coal: Its Distribution and Removal, R. L. Cawley. Fuel, vol. 3, no. 6, June 1924, pp. 211-212. From results recorded, it is apparent that in seam of coal there is no one variety or macroscopic ingredient that contains bulk of phosphorus.

Plastic State. The Plastic State of Coal, G. E. Foxwell. Fuel, vol. 3, nos. 5, 6, 7, 8, 9 and 10, May, June, July, Aug., Sept. and Oct. 1924, pp. 174-179, 206-210, 227-235, 276-283, 315-319 and 371-375, 14 figs. May and June: Path of travel of gases in coke oven. July: Temperature of formation and path of travel of principal by-products. Aug.: General physical phenomena associated with plastic state. Sept.: Chemical changes occurring during plastic stage; influence of previous history of coal on plastic curve. Oct.: Relationship between plastic curve, coking index and composition of coal.

Preheating, Effect of. The Influence of Preheating Unoxidized and Partially Oxidized Coal upon its Rate of Absorption of Oxygen, G. Coles and J. I. Graham. Fuel, vol. 3, no. 11, Nov. 1924, pp. 384-390. Results of experiments made with sample of non-coking coal from South Staffordshire; deals with effect of heating coal prior

to oxidation, and with effect of heat upon partially oxidized coal.

Preparation. Coal Preparation on Modern Principles (Kohlenaufbereitung nach neuzeitlichen Grundsätzen), E. Dupierry. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 35, Aug. 30, 1924, pp. 905-907, 5 figs. Discusses difference in preparation of high- and low-grade coal, coal washing, fine screening, dust collection, etc.

Reinforced-Concrete Buildings for Coal Preparation in the Ruhr (Eisenbetonbauten für die Aufbereitung der Kohle im Ruhrkohlenbergbau), A. Konrad. Bauingenieur, vol. 5, no. 13, July 15, 1924, pp. 391-394, 8 figs. Describes recent plants for crushing, screening, washing of coal, gas scrubbing plants, etc.

Selection, Preparation and Carbonization of Coal and Preparation of Coke, A. W. Grant, Jr. Am. Gas Assn. Monthly, vol. 6, nos. 8 and 9, Aug. and Sept. 1924, pp. 501-510 and 571-575, 5 figs. Discusses ash and sulphur contents and agglutinating values as reflected by transition of size of coal; sulphur; pulverization; cementing material in coal; coke degradation; heating; indices of coke comparison; etc.

The Preparation of Coal for the Market, F. S. Sinnatt and H. E. Mitton. Instn. Min. Engrs.—Trans., vol. 67, part 6, Sept. 1924, pp. 481-516, 21 figs. partly on supp. plates. See also Colliery Guardian, vol. 127, nos. 3311, 3312 and 3313, June 13, 20 and 27, 1924, pp. 1508-1510, 1580-1581, and (discussion) 1647-1648, 6 figs. Notes on screening of coal; purification in dry condition; pneumatic coal cleaning; coal-washing processes and tests.

The Preparation of Coals, J. Loriet. Queensland Govt. Min. Jl., vol. 24, no. 283, Dec. 1923, pp. 465-468. Requirements of consumers and responsibilities of producers; arrangement of storage hoppers, etc.; advances in mechanical equipment. Abridged from report in Chaleur et Industrie.

See also Cleaning; Drying; COAL WASHING.

Production Cost and Price. What Is the Relation of Cost of Production to the Price of Coal?, D. L. Wing. Coal Age, vol. 25, no. 12, Mar. 20, 1924, pp. 428-430. Efficiency of management, physical conditions, lost time, variation in payments for royalties and in amounts for depletion, depreciation and officers' salaries among factors that cause wide range in output costs.

Production, United States. Coal in 1922, F. G. Tryon and S. A. Hale. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:33, Oct. 2, 1924, pp. 439-669, 18 figs. Review of coal industry in 1922; statistics of production and labor; production classified by mining methods; world's production; production, by States.

Prospecting for. Studying Sub-soils Without Borings (O conhecimento do sub-solo sem sondagens), P. O. de Castro. Revista Brasileira de Engenharia, vol. 8, no. 4, Oct. 1924, pp. 113-117, 7 figs. Theory and practice of Mintrop "seismos" method for studying sub-soils by observing and measuring vibrations passing through earth from points of distant artificial explosions to recording seismographs, successfully used in Holland.

Pulverized. See PULVERIZED COAL.

Purchasing and Inspection. An Effective Method for Keeping Fuel Costs within Bounds, G. Milton Levy. Factory, vol. 32, no. 1, Jan. 1924, pp. 40-42, 2 figs. It has been found that by compositing coal by shippers, it is possible to determine quality of coal shipped from various mines and when unsatisfactory, shipments from that mine can be cancelled; presents chart showing results of this inspection over period of year.

Reaction Between Gas and. The Speed of Reaction and Its Bearing on Technology (Technik und Reaktionsgeschwindigkeit), H. v. Jüptner. Feuerungstechnik, vol. 12, nos. 7, 8, and 9, Jan. 1, 15, and Feb. 1, 1924, pp. 49-52, 58-60, and 66-70, 1 fig. Deals with speed of reaction between coal and gas; influences of temperature on reaction speeds.

Recovery from Ashes. Fuel Recovery from Pan Ash. Gas Jl., vol. 165, no. 3167, Jan. 23, 1924, pp. 200-201, 3 figs. Description of dry-magnetic ash-separating process and equipment.

Recovering the Unburned Fuel from Ashes, S. H. Bunnell. Combustion, vol. 11, no. 4, Oct. 1924, pp. 287-288, 2 figs. Describes three German inventions in practical use for recovering usable coke from common ashes, namely, magnetic ash separator produced by Krupp Works, Weber system, and Schilde system.

Refining Methods. Modern Coal Refining Methods, M. W. Neufeld. Eng. Progress, vol. 5, no. 6, June 1924, pp. 109-112, 3 figs. Importance of by-products; vertical rotary distilling furnace of firm of Meguin A. G.; benzol production according to Raschig method.

Relative Power-Plant Values. Relative Plant Values of Coal, K. M. Holaday. Elec. Wld., vol. 84, no. 8, Aug. 23, 1924, pp. 363-365, 1 fig. Shows how heating values, moisture content, ash content, and fusing temperature as determined by laboratory test, in conjunction with a grading table, can assist in comparing fuels of different quality.

Separation, Differential. How Differential Separation Improves Quality, H. M. Chance. Coal Trade Jl., vol. 55, no. 11, Mar. 12, 1924, pp. 225, 239, and 242. Describes method of separation used in anthracite region which will enable bituminous mines to reduce ash content of high-ash coals with minimum loss in waste.

Siberia. The Tunguzka Coal Basin and the Kureika Graphite Deposit (Le bassin houiller des Toungouzka et le gisement de graphite de Kouréika), V. Logatchoff. Annales de la Société Géologique de Belgique, vol. 66, no. 4, Apr. 15, 1924, pp. B264-B285, 8 figs. Discusses geology of Northern Siberia, coal and lignite deposits at Tunguzka, Norlisk, graphite-anthracite deposits at Kureika.

Sizing. The Sizing of Small Coal, Thos. Fraser. Coal Industry, vol. 7, nos. 2 and 3, Feb. and Mar. 1924, pp. 89-91 and 121-124. New conditions in sizing small fuel which have arisen; special shaker screens for small coal and coke; vibrating screens.

See also Cleaning.

South Africa. Coal in South Africa, W. T. Heslop. Instn. Min. Engrs.—Trans., vol. 68, part 1, Oct. 1924, pp. 90-109, 8 figs. See also Iron & Coal Trades Rev., vol. 109, no. 2940, July 4, 1924, pp. 1-4. Production; discusses coal seams, character of coals, ash analysis, igneous intrusions and underground conditions in Natal, spontaneous combustion of coal, Vereeniging conditions, and Witbank efficiency.

Specific Gravity and Ash Content. The Specific Gravity and Ash Content of Coal, T. J. Drakeley and J. R. I. Hepburn. Chem. & Industry, vol. 43, no. 34, Aug. 22, 1924, pp. 277T-278T, 1 fig. Investigation to determine whether relation exists between specific gravity of sample of coal and its ash content; it is shown that no relation exists between true and apparent specific gravities and ash contents of samples of clean coal from same seam; relation exists between true and apparent specific gravities and ash contents of average samples and equation is given for calculating ash content of coal from specific gravity.

Spitzbergen. Boring in Frozen Strata, R. L. A. Dron. Min. Inst. of Scotland—Trans., vol. 45, part 1, 1924, pp. 22-27, 2 figs. Discusses difficulties met with in boring through frozen strata

in Spitzbergen to prove coal, and arrangements made to meet them.

Spontaneous Combustion. Fires Due to Spontaneous Ignition in Northwestern Bohemian Colliery District (Einiges über Gruben- und Depot-Brände infolge von Selbstentzündung im nordwestböhmischen Braunkohlenreviere), J. Carniol. Montanistische Rundschau, vol. 16, no. 20, Oct. 16, 1924, pp. 547-553. Oxidation process and conditions favoring auto-oxidation; effect of size of grain, temperature, earth pressure, etc.; chemical causes; precautionary measures; etc.

Pyrites as a Cause of Spontaneous Combustion in Coal-Mines, J. I. Graham. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 100-109 and (discussion) 109-113. Results of researches.

Suitable Coal Storage and Avoidance of Spontaneous Combustion (Zweckmässige Kohlenlagerung und Verhütung ihrer Selbstentzündung), R. Rogenhofer. Sparwirtschaft, nos. 7-8, 9-10, and 11-12, Apr., May, and June 1924, pp. 32-34, 37-39, and 45-46. Reviews literature on storage in air, water, losses and change in composition. June: Means for preventing changes and spontaneous combustion.

Spontaneous Combustion of Coal, J. Ivor Graham. Chem. & Industry, vol. 43, no. 14, Apr. 4, 1924, pp. 79T-87T. Influence of pyrites; influence of moisture on rate of oxidation and on spontaneous heating; adsorption of gases by carbon.

The Spontaneous Ignition of Coal in Ships' Bunkers, J. H. Anderson. Inst. Mar. Engrs.—Trans., vol. 35, Jan. and Feb. 1924, pp. 479-487 and (discussion) 509-525. Deals with coal fires aboard ship.

See also Moisture in; COAL MINES, Spontaneous Combustion; PYRITES, Spontaneous Combustion Caused by.

Spontaneous Heating. An Adiabatic Method for Studying Spontaneous Heating of Coal, J. D. Davis and J. F. Byrne. Am. Ceramic Soc.—Jl., vol. 7, no. 11, Nov. 1924, pp. 809-816, 2 figs. Describes apparatus developed in Bur. Mines laboratory for investigation of spontaneous heating of coal with adiabatic control, and shows briefly extent of heating which takes place when adiabatic condition is maintained. Pub. by permission U. S. Bur. Mines.

Storage. See COAL STORAGE.

Sulphur Compounds, Decomposition of. The Decomposition of Sulphur Compounds in Coal by Heat, J. Jolly and R. V. Wheeler. Gas Wld., vol. 80, no. 2076, May 3, 1924, pp. 11-12. Outline of research carried out in Dept. of Fuel Technology of Sheffield Univ. to determine manner in which sulphur is eliminated during coking process, factors that influence retention of sulphur in coke, distribution of sulphur in products of destructive distillation of different coals dependent on temperature of heating and rate at which that temperature was attained.

Sulphur Determination in. Rapid Determination of Sulphur, Particularly in Coal (Schnellbestimmung von Schwefel, besonders in Kohlen), H. Bahr and W. v. D. Heide. Zeit. für angewandte Chemie, vol. 37, no. 43, Oct. 23, 1924, pp. 848-851. Pulverized coal is mixed with barium peroxide and granulated aluminum, and mixture briquetted and ignited in porcelain or quartz crucible covered with lid with hole in it or with second inverted crucible; method appears to compare favorably, as regards accuracy, with that of Eschka, but is not, in its present form, applicable to coke.

Sulphur Forms in. Sulfur Forms in Coal—Distribution and Control, H. F. Yancey and S. W. Parr. Indus. & Eng. Chem., vol 16, no. 5, May 1924, pp. 501-508, 7 figs. Investigation of distribution of forms of sulphur in two coal beds made at two mines in Illinois and one in Alabama; various types of coals are classified on basis of sulphur occurrence and removal.

Tar. See COAL TAR.

Testing. A Float-and-Sink Method for Testing Coarse Size Coal, E. R. McMillan and B. M. Bird. Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 164-169, 2 figs. Methods and apparatus used in testing coals; developed at Northwest experiment station of Bur. of Mines in coöperative research work with Univ. of Washington.

Alberta Coals. Colliery Guardian, vol. 127, no. 3289, Jan. 11, 1924, pp. 92-93, 3 figs. Information regarding testing of coal from third annual report of Sci. & Indus. Research Council of Alberta, including sampling at mine, analysis of coals, air calorimeter, comparison of coals, etc.

Standardization of the Methods of Testing Coal, Metallurgical Coke, and Briquets (Propositions pour l'unification des méthodes d'essai du charbon, du coke métallurgique, et des briquettes), Ch. Berthelot. Chimie & Industrie, special no., May 1924, pp. 167-207, 38 figs. Describes most accurate methods for examination with view to their adoption as standard methods of analysis; methods of determination of coking power of coal, fusibility of ash, moisture, volatile matter, total carbon, nitrogen, and phosphorus.

The Testing of Coal, F. Dawson. Eng. & Boiler House Rev., vol. 37, no. 10, May 1924, pp. 355-356 and 358, 2 figs. Discusses determination of nature of coal, or its proximate analysis, and determination of its heat value; describes type of bomb calorimeter in general use.

Thermal Conductivity and Specific Heat. The Thermal Conductivity and Specific Heat of Coal, F. S. Sinnatt and H. Macpherson. Fuel, vol. 3, no. 12, Jan. 1924, pp. 12-14. Method of determining thermal conductivity and specific heat.

Thermal Reactions during Carbonization. Thermal Reactions of Coal During Carbonisation, J. D. Davis and P. B. Place. Fuel, vol. 3, no. 12, Dec. 1924, pp. 434-439, 4 figs. Results of tests on seven typical American coals by Hollings and Cobb method; reaction heats by calorimetric method; results show that reaction heats of coal are small compared with total heat effects involved in carbonization process.

Trade of Great Britain. The Coal Trade of 1923. Colliery Guardian, vol. 127, no. 3288, Jan. 4, 1924, pp. 21-32 and 39-40, 7 figs. See also Iron & Coal Trades Rev., vol. 108, no. 2914, Jan. 4, 1924, pp. 1-8. Review by districts, including production, shipments, prices, coal and coke contracts, labor and wages, developments, etc.

Treatment. Treatment of Coal with Naphthalene (Sur le traitement des houilles par la naphtaline), M. Oswald and R. Pinta. Chimie et Industrie, vol. 12, no. 3, Sept. 1924, pp. 415-422, 2 figs. Advantages of naphthalene as a solvent; extraction apparatus and experiments; production of new materials, including low-temperature tar very rich in oil and low phenol content.

United States, Empirical Relations for. Empirical Relations for Coals in the United States, F. C. Evans. Sibley Jl. of Eng., vol. 38, nos. 7, 8, and 9, Oct., Nov., and Dec., 1924, pp. 160-167, 188-195, and 217-227, 29 figs. Reviews briefly formation and deposition of coals in United States. Determination of heating value of combustible from proportion of volatile matter. Determination of per cent total carbon and of hydrogen.

Value for Steam Generation. The Value of Coal for Steam Generation, C. A. Joerger. Combustion, vol. 10, no. 1, Jan. 1924, pp. 59-60 and 65. Basis of determining value of a coal, and discussion of some of the items which cause confusion in terms, efficiency, economy, and capacity.

Volatile Constituents, Determination. Determination of Volatile Constituents in Solid Fuels

(Beschouwingen over de bepaling der vluchtige bestanddeelen in vaste Brandstoffen), S. de Waard. Chemisch Weekblad, vol. 21, no. 38, Sept. 20, 1924, pp. 433-435, 2 figs. Suggestions of Kreulen for use of standard burner and crucible are supported, but actual apparatus is criticized.

Determination of Volatile Matter in Solid Fuels (Beschouwingen over de bepaling der vluchtige bestanddeelen in vaste brandstoffen), D. J. W. Kreulen.. Chemisch Weekblad, vol. 21, no. 1091, Aug. 23, 1924, pp. 396-398, 2 figs. For comparative purposes determination of yield of coke is more valuable than that of volatile matter, and method of determining former, using standard alcohol lamp, standard crucible with loose cover, and definite time of heating, is suggested; if coal be pressed into pastilles, useful information may be obtained, coking then proceeding, as on large scale, by skin formation.

The Determination of Volatile Matter in Coal and Coke. Gas Wld., vol. 80, no. 2081, June 7, 1924, pp. 9-12. Methods used, and details of experiments.

Volatile Matter and Ash Content. The Volatile Matter and Ash Contents of Samples of Coal from the Same Seam, T. J. Drakeley and J. R. I. Hepburn. Chem. & Industry, vol. 43, no. 18, May 2, 1924, pp. 134T-137T. Gives equation for calculating, on average samples of dry coal containing no iron pyrites, volatile-matter content of coal on ash-free basis; percentage of volatile matter yielded by dry shale appears to vary considerably; variations may be due to different methods employed in initial drying of shale; modified equations for calculating volatile-matter content of coal on ash-free bases, for crude-coal samples containing iron pyrites, etc.

Volumetric Measurement. The Metering of Coal, W. S. Findlay. Indus. Mgmt. (Lond.), vol. 11, no. 18, Dec. 1924, pp. 517-518, 1 fig. Describes devices for volumetric measurement of coal; advantages accruing from volumetric measurement.

Washing. See COAL WASHING.

World's Resources. The Coal Resources of the World, R. Redmayne. Colliery Guardian, vol. 128, no. 3314, July 4, 1924, pp. 23-24, 4 figs. Also Coal Trade Jl., vol. 55, no. 31, July 30, 1924, pp. 665-667. Discusses world's coal reserves, lignite or brown coal, economies in use of coal and coal substitutes; available and future supplies including lignite, peat, waterpower and solar radiation as substitutes.

X-Ray Analysis. See Analysis, X-Ray.

COAL BREAKERS

Baker, Baker—The Latest Glen Alden Breaker. Coal Age, vol. 26, no. 3, July 17, 1924, pp. 76-81; 12 figs. Describes breaker of Glen Alden Coal Co. Reaching breaker from several sources, coal is crushed on ground level and product elevated to top of building; simplicity and neatness foster a good morale.

COAL DEPOSITS

Africa. Coal Resources of the Zambezi (Les richesses charbonnières du Zambèze), A. C. Gérard. Société des Ingénieurs Civils de France —Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 244-261, 13 figs. partly on supp. plate. General considerations on African coal; description of the various basins in south and central Africa, including those of the Zambezi.

Alaska. Matanuska Coal Field Mines only 7,000 Tons Monthly. Coal Age, vol. 26, no. 26, Dec. 25, 1924, p. 896. Coal in Alaskan field varies from lignite to anthracite; latter is in places 40 ft. thick but folded and penetrated by dikes and sills.

Alberta, Canada. Structure in the Crowsnest Coal Area, Alberta, B. Rose. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 609-619, 1 fig. on supp. plate. Outlines geology and discusses structural problems encountered in locating and mining coal seams.

Arley Seam, Britain. Physical and Chemical Survey of the National Coal Resources. Iron & Coal Trades Rev., vol. 109, no. 2956, Oct. 24, 1924, pp. 661-662. Abstract of report issued by Fuel Research Board. General description of Arley seam of Lancaschire coal field; analyses of specimens of Arley coal; inorganic constituents; low-temperature carbonization; steaming in vertical gas retorts; behavior when heated in oxygen; microscopical examination; inflammability.

Australia. Geology and Mineral Occurrences, Pascoe River District, Cape York Peninsula, C. C. Morton, Queensland Govt. Min. Jl., vol. 25, nos. 286 and 287, Mar. and Apr. 1924, pp. 78-83 and 129-134, 12 figs. References to geological reports on areas within the Peninsula. Geological description; economic geology; gold occurrences; workings.

Austria. Coal Geology of the Austrian States (Kohlengeologie der österreichischen Teilstaaten), W. Petrascheck. Berg- u. Hüttenmännisches Jahrbuch, vol. 72, nos. 1 and 2, 1924, pp. 5-48 and 1-24, 64 figs. Details of coal deposits in Austrian Alps, including regions of Mürz and Mur rivers, Carinthia, lower Austria, Hungry, Enns Valley and Tyrol.

New Coal Deposits in Western Austria (Neue Kohlenvorkommen im westlichen Oberösterreich), G. Götzinger. Zeit. des Internationalen Vereines der Bohringenieure u. Bohrtechniker, vol. 32, no. 24, Dec. 15, 1924, pp. 185-188. Describes new seams at Thomasroith, Siedelberg, Höring, and others.

China. Preliminary Report on Some Coals from Sze Chuan, China. Economic Geology, vol. 19, no. 7, 1924, pp. 641-650. Values, properties, and geologic relations.

Coal Balls in. Coal Balls—The "Finger Prints" That Identify Coal, F. L. Clark. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 656-657, 5 figs. In these limestone nodules fossil plants unerringly establish age and character of each seam of coal, according to results obtained through investigations by Dr. Adolph Noé, paleobotanist at Univ. of Chicago.

Correlation Problems. Some Coal-Seam Correlation Problems in Alberta, R. L. Rutherford. Can. Inst. Min. & Metallurgy—Bul., no. 152, Dec. 1924, pp. 942-951, 3 figs. Discusses difficulties involved in securing correlation information, and points out salient factors upon which correlation is dependent.

Dutch East Indies. Coalfields of Netherlands East Indies, P. C. Coote. Iron & Coal Trades Rev., vol. 108, no. 2929, Apr. 18, 1924, pp. 628-629, 5 figs. State and private enterprise in Sumatra and Borneo.

Fossil Zones. Fossil Zones in the Carboniferous Rocks, O. T. Jones. Instn. Min. Engrs.-Trans., vol. 68, part 3, Dec. 1924, pp. 220-233. Work which has been carried on within last few years by a number of different investigators on distribution of fossils in these strata. Bibliography.

Germany. A Third Lausitz Seam at Greater Depth (Ueber ein tieferes drittes Lausitzer Flöz), Baldus. Braunkohle, vol. 23, no. 37, Dec. 13, 1924, pp. 689-691. Details of new coal seam at Dahme 5 m. in thickness, new lignite seam at Cottbus of 4.3 m., etc.

Ruhr Coal and Osnabrück Coal (Ruhrkarbon und Osnabrücker Karbon), W. Gothan and W. Haack. Glückauf, vol. 60, no. 26, June 28, 1924, pp. 535-541, 3 figs. Discusses main deposits on

basis of modern investigation, gas content, thickness of deposits, general geology.

New Brunswick, Canada. The Minto Coal Basin of New Brunswick, W. S. Dyer. Can. Inst. Min. & Metallurgy—Bul., no. 145, May 1924, pp. 251-275, 8 figs. Outline of principal results obtained in study of geology and coal resources of this basin. History, and previous geological work.

New Mexico. Coal Resources of the Raton Coal Field, Colfax County, New Mexico, W. T. Lee. U. S. Geol. Surv., Bul. 752, 1924, 251 pp., 50 figs., partly on supp. plates. Geography and geological features, and description of coal deposits and coal.

Pennsylvania. Coal Beds in Fayette County, Pennsylvania, J. D. Sisler. Coal Trade Bul., vol. 51, no. 9, Oct. 1, 1924, pp. 391-395. Structure and stratigraphy; correlations of coals; coke.

Coal Beds in Westmoreland County, Pennsylvania, J. D. Sisler. Coal Trade Bul., vol. 50, no. 9, Apr. 1, 1924, pp. 393-398. General geology, topography and stratigraphy, and description of different districts.

Dividing the State of Pennsylvania Into Areas Having Coal of Equal Volatile Content. Coal Age, vol. 26, no. 12, Sept. 18, 1924, pp. 403-406, 2 figs. How these areas were mapped; their form and reasons for it; why irregularities exist and how oil and gas are found only in places where coal contains both. Article adapted from Bul. no. 81 of Topographic and Geologic Survey.

The Deposit of Double-Thick Upper Freeport Coal Situated in the Valley of the Allegheny River in Allegheny, Butler and Westmoreland Counties, Pennsylvania, J. M. Rayburn. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 1, Feb. 1924, pp. 27-38 and (discussion) 39-44, 6 figs., partly on supp. plate. Describes development of field, geology, topography, and stratigraphy.

Russia. The Coal Deposits of Tkvibuli, E. Petkevich and Dolgov. Russian Min. Jl., vol. 100, no. 1, Jan. 1924, pp. 45-46. (In Russian.)

The Coke and Coal of Kuznetsk in the Ural Mountains, I. Fedorovich. Russian Min. Jl., vol. 100, no. 3, Mar. 1924, pp. 273-275. (In Russian.)

South Africa. Coal in South Africa, W. T. Heslop. So. African Eng., vol. 35, nos. 6 and 7, June 30 and July 31, 1924, pp. 117-120 and 139-142, 5 figs. Production data; description of various seams; character of coals.

The Coal Resources of Southern Rhodesia, H. B. Maufe. So. African Min. & Eng. Jl., vol. 35, no. 1714, Aug. 2, 1924, p. 1314. Discusses physical characteristics. Abstract of paper read before First World Power Conference.

South Wales. The Correlation of the Coal Measures in the Western Portion of the South Wales Coal-Field, Emily Dix and A. E. Trueman. So. Wales Inst. Engrs.—Proc., vol. 40, no. 5, Nov. 13, 1924, pp. 353-383, 15 figs. Coal measures of North Gower.

Strata Movements. The Heat Due to Strata-Movements and Its Effect on Certain Coal-Seams, H. Briggs, A. L. S. Owen and J. Wilson. Instn. Min. Engrs.—Trans., vol. 67, part 4, July 1924, pp. 355-373, 6 figs. Discusses bedding-glides and joint-glides, heat produced by faulting, effects of faults on coal-seams occurrence of cinder coal, calcareous coal, natural gas, etc.

Tasmania. The Coal Resources of Tasmania. Tasmania Dept. Mines, Geol. Surv., Mineral Resources No. 7, 1922, 273 pp., 37 figs. on supp. plates. Geology of coal formations; geologic structure of coal fields; general character, composition, and calorific value of coals; commercial and industrial applications and market value; relationship of coal resources of Tasmania to important mineral deposits and hydroelectric power stations, and bearing of this relationship on industrial development of Tasmania.

Virginia. Can the Valley Coal Fields of Virginia Compete With Those of the Anthracite Region? Coal Age, vol. 25, no. 8, Feb. 21, 1924, pp. 269-271, 2 figs. Coal is semi-anthracite, slightly lower in rank than Lykens Valley product; ash content high, being from 14 to 28 per cent.

The Geology and Mineral Resources of Wise County and the Coal-Bearing Portion of Scott County, Virginia, J. B. Eby, M. R. Campbell and G. W. Stos. Va. Geol. Survey—Bul., no. 24, 1923, 617 pp., 129 figs. and maps, partly on supp. plates. Includes chapter on forests of Wise County.

Wales. On a Group of Red Measures or "Coloured" Strata in the East Glamorganshire and Monmouthshire Coalfield, A. Howell and A. H. Cox. S. Wales Inst. Engrs.—Proc., vol. 40, no. 2, May 8, 1924, pp. 139-174, 4 figs. on supp. plates. Results of investigation of strata with view to establishing their distribution, thickness, and relations to beds above and below.

South Wales Coal Region Is Principal Competitor of American Mining Districts, H. Williams, Coal Age, vol. 25, no. 20, May 15, 1924, pp. 726-727, 1 fig. Extent and location of coal fields; classification of different grades of coal and their uses; difficulties experienced in mining and marketing of anthracite.

COAL DUMPERS. See COAL HANDLING, Piers.

COAL DUST

Explosions. Coal Dust Explosions. Colliery Guardian, vol. 127, no. 3301, Apr. 4, 1924, pp. 861-862, 2 figs. Details of experiments carried out at Eskmeals during 1923.

Coal Dust Explosions, J. E. Jones. Coal Mine Mgmt., vol. 3, no. 5, May 1924, pp. 25-32 and 55-59, 1 fig. How they can be prevented. Simple remedy in practical operation. Reprinted from Am. Labor Legislation Rev., Mar. 1924.

Humidification of Mine Air for the Purpose of Reducing the Dust Hazard, T. Chester. Coal Mine Mgmt., vol. 3, no. 2, Feb. 1924, pp. 27-34, 4 figs. Causes of dust explosions; humidity data; why humidification helps; humidifying apparatus.

Powdered Coal Hazards, H. G. Jacobsen. Concrete, vol. 24, no. 1, Jan. 1924, pp. 5-7 (Cement Mill Section). Reviews investigations that were carried on during more than 100 years from almost first time mention was made of coal dust as an explosive in itself until time, only a few years ago, when this point was conclusively proved.

Spreading Stone Dust with Compressed Air to Prevent Coal-Dust Explosions, C. Moran. Compressed Air Mag., vol. 29, no. 7, July 1924, pp. 917-918, 5 figs. Discusses testing of coal dust for explosion properties and application of stone-dust distribution and stone-dust shelving to prevent or arrest coal-dust explosions.

Stone Dusting or Rock Dusting to Prevent Coal-Dust Explosions, as Practiced in Great Britain and France, G. S. Rice. U. S. Bur. Mines, Bul. 225, 1924, 54 pp. Notes on investigations made in Great Britain, France, and Germany; preventive methods in United States; stone dusting or rock dusting methods observed in British, French, German, and Belgian mines; application in American mines of European experience in stone dusting or schistification.

See also COAL MINES, Rock Dusting.

Firing with. Coal-Dust Firing in Iron and Steel Works, W. Schmitz, Iron & Coal Trades Rev., vol. 108, no. 2928, Apr. 11, 1924, p. 597, 2 figs. Author's experience with use of coal-dust firing over a period of over two years in seven forge and six rolling-mill furnaces at a German iron and

steel works; fuel used consisted chiefly of briquet dust and dried Rhenish crude lignite, although all kinds of available waste coal and coke breeze were used. From article in recent issue of Stahl u. Eisen.

Laying with Bituloid. Experiments with Colloidal Oil (Bituloid) as a Medium for Laying Coal-Dust, H. Briggs and N. H. Wales. S. Wales Inst. Engrs.—Proc., vol. 40, no. 3, Sept. 4, 1924, pp. 233-255, 5 figs. and (discussion), nos. 4 and 5, Oct. 9 and Nov. 13, 1924, pp. 262-290 and 325-330. See also Colliery Guardian, vol. 128, no. 3324, Sept. 12, 1924, pp. 673-674, 1 fig., and Iron & Coal Trades Rev., vol. 109, nos. 2950 and 2951, Sept. 12 and 19, 1924, pp. 431-433 and (discussion) p. 477. Nature of bituloid, manner of application, and costs; preliminary tests at Eskmeals and at certain coal mines; ignition tests at Straiton mine; further advantages and drawbacks.

COAL GAS

Benzene Extraction. Experiments on Extraction of Benzene from Coal Gas, A. C. Blackall. Gas Age-Rec., vol. 54, no. 23, Dec. 6, 1924, p. 794. Application of silica gel as an absorption agent shows considerable promise according to recent gas works experiments in England.

Benzol Content, Determination. Simplified Method for the Determination of Benzol Content in Gas by Means of Active Charcoal (Vereinfachte Arbeitsweise zur Bestimmung des Benzolgehaltes im Gase mit aktiver Kohle), A. Schmolke. Gas- u. Wasserfach, vol. 67, no. 7, Feb. 16, 1924, pp. 77-78. Describes method and apparatus developed by author, comprising adsorption vessel, vaporizer, superheater, air bath, cooler, and measuring burette, conveniently connected.

CO Elimination. See CARBON MONOXIDE, Elimination from Town Gas.

Condensation. The Condensation of Gas in Gas Works and Coke Plants (La condensation du gaz dans les usines à gaz et dans les cokeries), A. Grebel and H. Bouron. Génie Civil, vol. 84, no. 6, Feb. 9, 1924, pp. 130-133. Theory of condensation; cold condensation; productions of condensation; quantities of heat to be absorbed by pipes and condensers.

Corrosion Due to. The Corrosion Caused by Products of Combustion of Coal Gas, U. R. Evans. Chem. & Industry, vol. 43, no. 20, May 16, 1924, pp. 506-507. Investigation as to whether practice of employing coal gas in place of direct combustion of solid fuel tends to increase or reduce damage, with special reference to indoor corrosion.

Double Gas. See COAL, Gasification.

Hydrocarbons in. The Estimation of Condensable Hydrocarbons in Coal Gas by Solid Absorbents, W. Green and E. G. Maw. Gas Wld., vol. 81, no. 2085, July 5, 1924, pp. 11-13. Discusses adsorption tests, silica gel adsorption tests on coal gas, active carbon adsorption tests on coal gas, and comparative adsorption tests on coal gas.

Illuminating Power. Effect of Addition of Water Gas and Nitrogen to Coal Gas on Light Intensity of Gas Mantles (Einfluss von Wassergas- und Stickstoffzusatz zum Steinkohlengas auf die Lichtstärke des Gasglühlichts), P. Eitner. Gas- u. Wasserfach, vol. 67, no. 36, Sept. 6, 1924, pp. 539-541. Results of tests show that on addition of water gas calorific value and light intensity decreases, and temperature of combustion increases; on addition of nitrogen both calorific value and flame temperature decrease.

Low-Temperature-Carbonization. Composition of Low-Temperature-Carbonization Gas from a Rotary Oven at Different Temperatures (Ueber die Zusammensetzung des Schwelgases bei verschiedenen Temperaturintervallen des Drehofens), H. Arnold. Zeit. für angewandte Chemie, vol. 37, no. 7, Feb. 14, 1924, pp. 85-87. Analyses of gas obtained at various temperatures by carbonizing charge of 10 kg. of Rhenish gas coal (Lohberg) in rotary oven; determination of constituent gases; figures are given for composition of gas after passage through active charcoal.

Manufacture. See GAS MANUFACTURE.

Naphthalene Removal. Removal of Naphthalene from Gas by Oil Scrubbing, Rob. D. Pike and Geo. H. West. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 253-257, 5 figs. Gives two principal criteria for choice of scrubbing oils, namely, naphthalene vapor pressure characteristic of oil at constant temperature, and viscosity.

Prussian Blue from. Direct Preparation of Prussian Blue from Coal Gas, Achille Delcleve. Gas Jl., vol. 165, no. 3165, Jan. 9, 1924, pp. 92-93. Suggests process for treatment of coal gas which will result in direct preparation of refined commercial Prussian blue. Translated from Chimie et Industrie.

Sulphur Elimination. Elimination of Sulphur from Coal Gas. Gas Wld., vol. 81, no. 2094, Sept. 6, 1924, pp. 248-249, 7 figs. Discusses laboratory experiments carried out at Christiania municipal gas-works.

COAL HANDLING

Aerial Cableways for. See CABLEWAYS, Coal-Handling.

Boiler Plants. Coaling and Ash Removal in Boiler Houses (Kesselhausbekohlung und -entaschung), R. Baumann. Wärme, vol. 47, nos. 6 and 7, Feb. 8 and 15, 1924, pp. 51-53 and 63-65, 16 figs. Describes boiler-house coaling plant with tipping and gripping devices of great efficiency and requiring little attendance; and method for removal, cooling and loading into ash car of red-hot ashes; points out cleanliness and economy of method.

Car Dumpers. See CAR DUMPERS.

Conveyors. Belt Conveyors at Work, J. M. Cowan. Iron & Coal Trades Rev., vol. 108, no. 2914, Jan. 4, 1924, p. 26, 1 fig. Method of roof support for conveyor face; description of conveyors used; shifting of conveyor; gate-end loader.

Coal Bunkers, Coal and Ash Conveyors. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 100-104, 106, 108 and 110, 16 figs. Design of coal bins, method of suspension and how lined; operation and types of coal and ash-conveying apparatus.

Coal Face Conveyors, R. Burt. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 38-42, 4 figs. Practical notes relating to methods of application of these plants, as practiced in Fife coal field, Scotland.

Coal Handling for Boiler Houses by Means of Cable Conveyor Plants (Kesselhausbekohlung durch Seilconveyoranlagen), F. Riedig. Fördertechnik u. Frachtverkehr, vol. 17, no. 22, Nov. 18, 1924, pp. 312-314, 10 figs. Describes several types of single-group and multi-group cable conveyors for coaling boilers, built by Bleichert & Co.

Modern Developments in Coal Conveyors and Haulage Arrangements for Dealing with the Coal From the Working Face to the Pit Bottom, G. L. Leston. S. Wales Inst. Engrs.—Prac., vol. 40, no. 2, May 8, 1924, pp. 175-205, 10 figs.

Use of Conveyor Belts in Modern Coal Storage. Belting, vol. 25, no. 3, Sept. 1924, pp. 36 and 38, 3 figs. Describes methods of handling fuel by American Hominy Co.; coal mechanically handled from freight cars to firebox.

See also CONVEYORS, Sectional Portable.

Equipment for. How Mechanical Handling Cuts Power Costs, M. W. Potts. Indus. Mgmt. (N Y), vol. 68, no. 6, Dec. 1924, pp. 341-348, 14 figs.

Describes types of coal and ash-handling equipment.

See also CENTRAL STATIONS, Brooklyn Edison, Hudson Ave.; Chicago, Ill.; St. Louis, Mo.; MATERIALS HANDLING, Equipment.

Harbor Plants. Coal and Ore Handling Plant at Waalhaven, Rotterdam. Engineer, vol. 137, no. 3574, June 27, 1924, pp. 722-725, 8 figs. Details of installation of Coal Trading Assn. which, when completed, will comprise two quays 350 m. long, with accommodation for ocean-going vessels up to 10 m. draft, and between quays a dock 160 m. long available for river vessels with drafts up to 6 m.; description of transporter bridges, and transformer and load-equalizing station.

Loading Machines. Factors in Various Types of Machines, R. A. Walter. Coal Industry, vol. 7, no. 7, July 1924, pp. 264-266. Only one-half of loading machines operating successfully; suitable mining methods necessary to make others satisfactory.

How to Get Big Output From Loading Machines, W. M. Dake. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 689-694, 6 figs. Plans that enable loaders to keep working steadily but which do not involve radical reconstruction of mine workings or abandonment of room-and-pillar methods.

Interpretation of Progress in Mechanical Loading, A. F. Brosky. Coal Age, vol. 25, no. 3, Jan. 17, 1924, pp. 67-72, 9 figs. Types and principles of machines and appurtenances.

Machines Load More Than 100 Tons per Shift in Mines on Paint Creek, West Virginia, A. F. Brosky. Coal Age, vol. 26, no. 2, July 10, 1924, pp. 37-41, 7 figs. Operating details of loading machines in mines of Kingston Pocahontas Coal Co. and of Imperial Colliery Co.

Mechanical Coal Loading, R. A. Walter. Coal Mine Mgmt., vol. 3, no. 4, Apr. 1924, pp. 50-54. Factors influencing selection of equipment and system.

Mechanical Loading—Advantages and Disadvantages. Min. Congress Jl., vol. 10, no. 6, June 1924, pp. 267-271, 3 figs. Rapid development of machine loading; application of various types of loaders; room and pillar mining; mine cars; conveyor haulage; combined cutting and loading machines; etc. Discussion at Am. Min. Congress meeting.

One More Mechanical Loader Comes to Light. Coal Age, vol. 25, no. 9, Feb. 28, 1924, pp. 305-306, 2 figs. Wilson chain loader for low coal weights 4600 lb. and has maximum height of 32 in.; it has loaded 69 tons of coal a day and 120 tons of loose gob.

Performance, Type and Application of Mechanical Coal Loading Devices, R. A. Walter. Coal Mine Mgmt., vol. 3, no. 6, June 1924, pp. 38-42 and 51. Classification of loading machines. Deals with conveying devices, scraping loaders, shoveling machines, pressure loaders, digging loaders, gathering loaders, combined cutters and loaders, and heading drivers.

Locomotive Plants. Locomotive Coaling Plant Recently Installed by the Italian State Railway, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 5, Mar. 6, 1924, pp. 133-135, 2 figs. Describes installation of stationary type, built entirely of mild steel, erected in duplicate, one at Foggia and one at Rimini, embodying latest developments of its type.

Low-Cost System. Low Cost Handling of Coal and Ashes, F. Schultz. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 623-626, 8 figs. Describes system suited to industrial power plants.

Lowering Down Hillside. Lowering Coal Down Hillsides with Minimum Breakage, M. L. O'Neale. Coal Age, vol. 25, no. 20, May 15, 1924, pp. 715-721, 12 figs. Points out that type of conveyor to be chosen depends chiefly on such factors as length and inclination of hillside.

Piers. Electrically Operated Coal Pier, R. W. McNeill. South. Engr., vol. 42, no. 4, Dec. 1924, pp. 40-44, 7 figs. Describes new coal pier of West. Md. Ry. Co., at Port Covington, Baltimore; 30,000 tons of coal are handled per day of two 10-hour shifts with 50-ton coal cars; with 100-ton cars capacity is between 40,000 and 50,000 tons per day.

Modern Practice of Handling Coal in Bulk at Coal Piers, J. W. Speer. Elec. Jl., vol. 21, no. 6, June 1924, pp. 260-265, 11 figs. Turning-type dumper installation, direct loading stationary lifting-type dumper, direct loading stationary revolving-type dumper, mechanical coal trimmers, etc.

New Coal Pier at Hampton Roads, Virginian Ry. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 487-498, 25 figs. Description of Coal Pier No. 2, now under construction, at Sewalls Point, Va., and construction details.

Virginian Ry. Builds Double Car-Dumper Coaling Pier. Eng. News-Rec., vol. 93, no. 12, Sept. 18, 1924, pp. 452-455, 5 figs. Describes coaling pier at Sewalls Point, Va., and its equipment. Car dumpers handling 120-ton cars load 130-ton elevator buckets for charging motor transfer cars on deck of pier. Traveling towers on lower deck place coal in ship and trim cargo.

Power Plants. Coal and Ash Handling Plant. Eng. & Boiler House Rev., vol. 38, no. 4, Oct. 1924, pp. 135-140, 143-144, 147-148, and 150, 20 figs. Review of principal methods in present-day use for handling of coal and ash in boiler house.

Coal and Ash Handling Systems for Power Plants, J. W. Geiger. Nat. Engr., vol. 28, no. 2, Feb. 1924, pp. 53-56. Description, advantages and disadvantages of different types of apparatus; factors to be considered in selection.

Coal Handling in Small Boiler Plants. Power Engr., vol. 19, no. 218, May 1924, pp. 171-172, 4 figs. Notes concerning plant with but one or two boilers.

Coal Handling Plant at the East Greenwich Power Station. Engineer, vol. 137, no. 3574, June 27, 1924, pp. 715-716, 5 figs. partly on p. 718. Designed to deal with some 200 tons of coal per hour when working at full power; comprises two Temperley transporters, which operate on a jetty at river side, and a system of conveyors which receive coal unloaded from vessels by transporters and deliver it either into storage bunkers or into bunkers over boiler house.

Coal-Handling System, J. A. Beck. Combustion, vol. 11, no. 2, Aug. 1924, pp. 120-121, 3 figs. Description of apparatus installed at plant of Kansas Gas & Elec. Co. at Strauss, Kan., and of method of operation.

Industrial Coal-Handling Equipment, Geo. E. Titcomb. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 79-84, 10 figs. Types, capacities, and adaptability of various installations.

Pulverized Coal. See CONVEYORS, Pulverized-Material.

Pumping Station. How a Milwaukee Pumping Station Handles Coal, N. L. Davis. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1009-1012, 10 figs. Describes coal handling equipment at Riverside Pumping Station at Milwaukee, Wis

Ropeway System. Ropeway for Coaling a London Hotel, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 9, May 1, 1924, pp. 243-245 and 249, 6 figs. Description of ropeway which brings coal to store or stoke hole at Hotel Cecil; is of standard bi-cable type; total length from center feeding to center delivery terminal 230 ft.; two rail ropes ¾ in. in diam.; 3-hp. motor operates ¼-in.-

diam hauling rope at speed of 25 ft. per min. at feeding terminal.

Shipping Plant. Coal-Shipping Plant at the Clarence Works of Messrs. Dorman, Long & Company, Limited. Iron & Coal Trades Rev., vol. 109, no. 2951, Sept. 19, 1924, pp. 469-470, 3 figs. Details of new wharf and loading plant.

Tipples. See COAL TIPPLES.

Underground Transportation. Four-Mile Belt Line Carries 9,426 Tons of Coal in One Day at Frick Company Mine, Thos. W. Dawson. Coal Age, vol. 26, no. 26, Dec. 25, 1924, pp. 897-905, 5 figs. Methods employed by H. C. Frick Coke Co. in transporting coal; nineteen 48-in. belts and one 60-in. deliver to river dump all coal from three mines formerly entered by shaft; 35 cars discharged at one time by each of two revolving dumps.

COAL INDUSTRY

Brazil, Market of. Coal Market of Brazil, M. A. Cremer. Trade Information Bul. (Supp. to Commerce Reports), no. 275, Oct. 11, 1924, 22 pp. Market for American coal—extent and character of market; kinds of coal used; coal-handling facilities. Brazilian coal-mining industry—type of coal mines; manufacture and use of pulverized coal and briquets, manufacture of coke.

France. A Survey of the French Coal Industry, J. R. Cahill. Iron & Coal Trades Rev., vol. 109, no. 2950, Sept. 12, 1924, pp. 444-446. Review of operations of representative coal mines.

French Coal Industry in 1924. Black Diamond, vol. 73, no. 26, Dec. 27, 1924, pp. 735-736, 1 fig. Discussion of present status and problems to be met and solved. Production, consumption, importation and exportation, output of Lorraine, reparation fuels, prices, etc.

Literature, 1923. Literature of the Coal Industry for 1923, E. H. McClelland. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 39-42. Classified list of more important books, serials and trade publications which have appeared during year, with few of earlier date.

Nova Scotia. Cape Breton's Coal and Steel Industries. Iron & Steel of Can., vol. 7, no. 12, Dec. 1924, pp. 237-243, 5 figs. See also Can. Min. Jl., vol. 45, no. 50, Dec. 12, 1924, pp. 1215-1219, 4 figs. Influence of steel manufacture on coal production; part of coal and steel in the war; submarine coal mining; Cape Breton coal as anthracite equivalent; conditions of employments and wages; details of steel plant.

COAL MINES

Acid Water in. Spontaneous Combustion and Acid Water in a Borneo Mine, R. Allen. Iron & Coal Trades Rev., vol. 108, no. 2920, Feb. 15, 1924, pp. 262-263, 6 figs. Describes how troubles of spontaneous combustion and acid water were dealt with at colliery of Cowie Harbor Coal Co., Ltd., in British North Borneo.

Accidents. Statistical Analysis of Coal Mine Accidents in Pennsylvania, 1916-1922. Coal Trade Bul., vol. 50, no. 10, Apr. 16, 1924, pp. 440-442. Describes tables compiled by Coal Mine Section of Pennsylvania Compensation Rating and Inspection Bur., Harrisburg, Pa.

After-Damp. After-Damp. Sci. & Art of Min., vol. 34, no. 12, Jan. 5, 1924, p. 179. Physiological effects; effects on lights; nitrous fumes and tests therefor.

Alabama. Marvel Plant Largest of Any in Cahaba Field (Alabama). Coal Age, vol. 26, no. 23, Dec. 4, 1924, pp. 796-798, 4 figs. All coal drawn from steep slopes; pitch near surface 15 deg.; vibrating screens and tables used for cleaning coal; repair equipment.

Austria. Austrian Coal Fair (Oesterreichische Kohlenmesse), H. Schürff. Montanistische Rundschau, vol. 16, no. 17, Sept. 1, 1924, pp. II-LII, 15 figs. A series of articles covering future of Austrian coal mining, pulverized coal, tabular list of Austrian coal mines, activities of Oesterrichisch-Alpinen, Statzendorfer, Zillingdorf, Schrambacher, Grümbacher, and other mining companies.

Baths, Pit-Head. Pit-Head Baths at Ellington Colliery. Iron & Coal Trades Rev., vol. 108, no. 2924, Mar. 14, 1924, pp. 423-425, 7 figs. Particulars of baths of Ashington Coal Co., Ltd., England.

Belgium. Campine Region—A Coal Field with No Completed Shaft Less Than Two Thousand Feet Deep, D. Adam. Coal Age, vol. 26, no. 8, Aug. 21, 1924, pp. 247-251, 6 figs. Coal discovered in 1901; apparently portion of field extending from England to Germany; coal of excellent quality especially for metallurgical fuel; Longwall mining and rope haulage adopted.

Bituminous, Labor Required. Data About Labor Employed in Various Bituminous Coal Mines, H. N. Eavenson. Am. Inst. Min. & Met. Engrs.—Trans., no. 1285-C, Jan. 1924, 20 pp., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 28-29. Data collected to furnish idea of amount required in various operations of bituminous mining to produce a ton of coal, plants selected being well-managed ones; contains figures compiled from U. S. Coal Commission's report showing average amount of labor in various classes of mines.

British Empire Exhibition. The Colliery at the British Empire Exhibition. Engineering, vol. 117, nos. 3047, 3049, 3050, and 3051, and vol. 118, nos. 3054, 3057, 3058, 3059, 3060, 3062, 3064, and 3067, May 23, June 6, 13, 20, July 11, Aug. 1, 8, 15, 22, Sept. 5, 19 and Oct. 10, 1924, pp. 677-680, 726-729, 756-759, 793-795, 49-51, 158-160, 190-193, 224-227, 251-252, 338-342, 411-414 and 528-530, 174 figs., partly on supp. plates. Full-size representation of actual working colliery, with all essential features of modern high-class installation; details of engine room, brake engine and overwinder, overwinding prevention gear, head gear, safety hooks, and gears, safety gates, decking control, liquid controller, motors, high- and low-tension switchgear, transformer-room supply, air compressors, meters, coal cutters, conveyors, coal-washing apparatus, etc.

See also Wembley Exhibition, England.

Bumps and Shock Waves. Bumps and Shocks Disturb Johnson Colliery, D. C. Ashmead. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 641-643, 4 figs. Describes accidents occurring at coal mine near Dickson City, Pa.; bumps seem to occur during pillar operations; direction of bump force not always determinate; relief of rock tension appears to cause bumps.

Cage-Loading Platforms. Improved Cage-Loading Platforms (Neuere Bauarten der Förderkorb-Anschlussbühne von Eickelberg), H. Grahn. Glückauf, vol. 60, no. 44, Nov. 1, 1924, pp. 1014-1015, 2 figs. New constructions of Eickelberg connecting platform embody number of mechanical improvements, and cause less obstruction than original type; new platform operates automatically, oncoming tub pressing on lever which projects above rail level, and thus causing platforms on both sides of shaft to come down definitely, but smoothly, on cage bottom.

Canada. Industrial Conditions in the Crow's Nest Pass Coal-Field, R. Strachan. Can. Inst. Min. & Metallurgy, no. 148, Aug. 1924, pp. 519-530. Analysis of coal, production of coal and coke, freight rates, testing fuels, program of research.

Lethbridge Coal Field Developing Rapidly, J. H. Turner. Coal Age, vol. 26, no. 13, Mar 27,

1924, pp. 459-461; 1 fig. Production of mines of Lethbridge coal field, in Alberta, Can.; analysis of coal; advantages possessed by this field which reduce mining cost.

The Disabilities of the Coal-Mining Industry in South-Eastern British Columbia and Possible Remedies, R. M. Young. Can. Inst. Min. & Metallurgy, no. 148, Aug. 1924, pp. 511-518. Discusses high cost of production, including high wages, expensive upkeep and repairs, competition from oil, etc.

Cars. See MINE CARS.

Coal Handling. See COAL HANDLING.

Coal-Loading Machines. Making Coal-Loading Machines Work Successfully in Indiana, D. Ingle. Coal Age, vol. 25, no. 5, Jan. 31, 1924, pp. 163-166, 3 figs. Ayrshire Coal Co. cuts loading costs even on room-and-pillar system with machines averaging but 75 tons daily; with snubbing more lump is obtained than with hand loading.

Colliery, Model. See Wembley Exhibition.

Colorado. The Development of the Alamo Mine Property, J. H. Emrick and E. A. Baird. Coal Trade Bul., vol. 50, no. 11, May 1, 1924, pp. 479-481, 7 figs. Notes on development of and mining methods at property of Alamo Coal Co. located 17 miles from Walsenburg, Colo.

Compressed-Air Installation. The Rhymney Valley Compressed Air Installation, E. L. Hann. Colliery Guardian, vol. 127, no. 3313, June 27, 1924, pp. 1643-1644, 5 figs. Installation described serves group of 11 collieries, property of Powell Duffryn Steam Coal Co., Ltd., and Rhymney Iron Co., Ltd., situated in Rhymney Valley. Describes turbo-compressing plant; compressors built by Brown, Boveri & Co., Baden, and steam turbines driving them by Escher Wyss & Co., S. Africa.

Concrete Construction. "Build Everything of Concrete" Is O'Gara Policy, Ralph D. Brown. Coal Age, vol. 25, no. 16, Apr. 17, 1924, pp. 557-562, 8 figs. Tipple and rescreener cast monolithic and in one unit at O'Gara mine, Harrisburg, Ill.; concrete also used in shaft bottoms, roof arches, mule stables, etc., underground; concrete haulage-way roadbed under test.

Conveying, Skip. The Storage Principle in Coal Mining With Special Reference to Skip Conveying and Its Effect on Power Economics (Der Speicherungsgrundsatz im Steinkohlenbergbau unter besonderer Berücksichtigung der Gefässförderung und ihres Einflusses auf die Kraftwirtschaft), P. Lüth. Glückauf, vol. 60, nos. 41 and 42, Oct. 11 and 18, 1924, pp. 919-925 and 947-954, 27 figs. Advantages of storage for economic working; storage of materials and energy; plants with uniform and irregular loads; arrangement and advantages of skip conveying.

Conveyors. Conveyor That Facilities Concentrated Mining, N. D. Levin. Coal Age, vol. 26, no. 16, Oct. 16, 1924, pp. 541-544, 12 figs. Describes type of conveyor developed by Jeffrey Mfg. Co., Columbus, Ohio; so constructed that it can be lengthened or shortened quickly.

Decking Plants. Electro-Pneumatic Decking at Parkhill Colliery. Colliery Guardian, vol. 127, no. 3298, Mar. 14, 1924, pp. 673-674, 8 figs. Description of plant designed and erected by Westinghouse Brake & Saxby Signal Co., Ltd., Lond.

Modern Design in Colliery Plants and Shaft Fittings. Colliery Guardian, vol. 128, no. 3317, July 25, 1924, pp. 221-222, 5 figs. Describes pneumatic decking plant, with mechanical interlocking, now under construction for a Japanese colliery; arranged for simultaneous decking with two decks; also describes kep gear and cages.

Dewatering. Be Alert to Danger When Unwatering Coal Mines, L. D. Tracy. Coal Age, vol. 26, no. 21, Nov. 20, 1924, pp. 723-724. Points out that no one should go ahead of air with open light unless tests have been made for gas; air current should be promptly reëstablished.

The Water-Hoist for Shaft Un-Watering, J. J. Rutledge. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 26-28, 2 figs. Construction and operation of water box, used in conjunction with hoisting cage; probably best method for dewatering shaft.

Dust Control. See Ventilation.

Dust Laying. See COAL DUST, Laying with Bituloid.

Electric Winding. Electric Winding at Harworth Main Colliery. Iron & Coal Trades Rev., vol. 109, no. 2947, Aug. 22, 1924, pp. 305-307, 7 figs. See also Colliery Engr., vol. 1, no. 7, Sept. 1924, pp. 313-320, 11 figs. Detailed description of Harworth Main Colliery and its equipment.

Electrical Apparatus, Flameproof. Flameproof Electrical Apparatus for use in Coal Mines. Colliery Guardian, vol. 128, nos. 3326 and 3327, Sept. 26 and Oct. 3, 1924, pp. 809-811 and 874-875, 8 figs. Abstract of report of Brit. Mines Dept. dealing with flange protection, and giving results of experiments.

Electrical Equipment. Baker Electric Plant Guarded Against Breakdown, E. J. Gealy. Coal Age, vol. 26, no. 4, July 24, 1924, pp. 117-120, 10 figs. Two circuits of over 4000-volt current supply breaker; provisions to keep equipment from dust; impellers for 20-ft. lift at jigs designed so as to prevent slate in water from wearing pump parts.

Glen Alden Generates and Distributes More Power Than Any Utility Firm in Hard-Coal Region, E. J. Gealy. Coal Age, vol. 26, no. 3, July 17, 1924, pp. 82-90, 22 figs. Description of electrical equipment of Glen Alden Coal Co.'s Mines. Line pressures as high as 66,000 volts used. More power used above than below ground.

Lewis Mine Provides Against Electrical Shutdown and Uses Block System of Development, A. F. Brosky. Coal Age, vol. 25, no. 10, Mar. 6, 1924, pp. 343-346, 5 figs. Alternating current used for everything except haulage at mine of Hudson Coal Co., Wolf Summit, W. Va.; mainline haulage equipment pressed into service to gather cars.

Electrical Equipment, Hazards of. Hazards of Electric Sparks and Arcs in Coal Mines, L. C. Ilsley. U. S. Bur. Mines—Reports of Investigations, no. 2626, July 1924, 2 pp. Gives list of disasters from 1910 to 1924 attributed to electrical apparatus and circuits.

Electrical Machinery, Grounding of. The Grounding of Electrical Mining Machinery, C. M. Means. Coal Mine Mgmt., vol. 3, no. 9, Sept. 1924, pp. 40-42. Securing an adequate ground; grounds for pump motors; movable electrical machinery; relative dangers of a. c. and d. c.

Electrical Surveys. Electrical Surveys in Coal Mines, E. B. Stavely. Coal Industry, vol. 7, no. 2, Feb. 1924, pp. 68-72, 4 figs. Use of portable graphic instruments to determine voltage, current, power demand and power factor conditions; inefficient equipment often disclosed.

Electricity in. Electric and Mining Industries in the North of France (L'industrie électrique et l'industrie minière dans le Nord de la France), M. Blum-Picard. Revue de l'Industrie Minérale, no. 90, Sept. 15, 1924, pp. 445-465, 2 figs. partly on supp. plate. Development of use of electricity by mining companies; details of central stations; and power distribution, steam power data, etc.

Electrical Construction in Coal Mines, E. B. Stavely. Coal Industry, vol. 7, no. 3, Mar. 1924, pp. 104-108, 3 figs. Discusses mechanical design and installation of underground mine distribution

systems; factors to be considered in specifying line materials.

Electricity in Coal Mines, R. Nelson. Engineering, vol. 118, no. 3059, Aug. 15, 1924, pp. 243-244. Indicates obstacles to use of electricity in mines which have been overcome. Paper, abridged, read at Empire Min. & Met. Congress.

Some Researches on the Safe Use of Electricity in Coal Mines, W. M. Thornton. Instn. Elec. Engrs.—Jl., vol. 62, no. 330, June 1924, pp. 481-491 and (discussion) 491-514, 10 figs. Results of investigation; deals with electrical ignition of coal dust alone, coal dust with gas present, of methane and associated gases by disruptive sparks, steady or impulsive, transient arcs, direct or alternating, with varied voltage and frequency, in all percentages of mixture with air; gives examples of application of results to promote safety in mines.

The Present Trend of Electrical Safety in Coal Mines, L. C. Ilsley. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 341-344. Discusses hazards of electrical equipment, and interests of coal-mine operator, miner, state inspector, underwriters of compensation insurance, and manufacturer of electrical equipment in safety measures.

The Use and Abuse of Electricity in Coal Mines, J. A. B. Horsley. Iron & Coal Trades Rev., vol. 109, nos. 2961 and 2962, Nov. 28 and Dec. 5, 1924, pp. 861-862 and 924-926, 15 figs. See also Colliery Guardian, vol. 128, no. 3335, Nov. 28, 1924, pp. 1375-1378, 18 figs. and (discussion) no. 3336, Dec. 5, 1924, p. 1449. Improvement in equipment; testing; leakage indicators; earthing; joints in cable armoring; routine tests; sealing dielectric cables; overload protection.

Electrification. Electrification of Nunnery Colliery, C. S. Magee. Iron & Coal Trades Rev., vol. 108, no. 2920, Feb. 15, 1924, pp. 251-254, 4 figs. Description of electrical equipment of colliery situated on outskirts of Sheffield, Eng.

Elkville, Ill. "The Hartshorns" Open Big Illinois Strip Pit, E. W. Davidson. Coal Age, vol. 26, no. 10, Sept. 4, 1924, pp. 319-322, 5 figs. Describes new mine operated by Black Servant Coal Co., at Elkville, Ill. Careful prospecting and long stripping experience utilized in pit layout; except for one shovel and six locomotives, pit will be electrically operated throughout.

Engineers, Opportunities for. Opportunities for Engineers in the Coal Mines, R. Dawson Hall. Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 491-492. Points out that there is equal opportunity in coal and metal mining. Abstract of A.I.M.E. paper.

England. Old Workings at New Kilburn Colliery, D. W. Flint. Iron & Coal Trades Rev., vol. 109, no. 2942, July 18, 1924, pp. 108-110, 6 figs. Discusses driving new adit toward full dip of seam, compares old and new methods of working. Abstract of paper read before Nat. Assn. Colliery Mgrs.

The Horden Colliery. Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 76-90, 23 figs. Description of equipment of colliery in county of Durham, England, winding over 4000 tons of coal per day.

The Physical and Chemical Survey of the National Coal Resources of Great Britain, C. H. Lander. Colliery Guardian, vol. 128, no. 3314, July 4, 1924, p. 21. See also Iron & Coal Trades Rev., vol. 109, no. 2940, July 4, 1924, pp. 7-8. Deals primarily with physical and chemical characteristics of different seams and how these vary; also purpose for which different classes of coal are best suited, and how they can be best utilized for these purposes, and distribution of coal, and its relation to other rocks and minerals.

The Pits of the Cannock Chase Colliery Co., Ltd. Colliery Guardian, vol. 128, no. 3337, Dec. 12, 1924, pp. 1495-1497, 14 figs. Excellent results that can be obtained from modernization and centralization of old collieries. Gives examples of interesting recording systems and ingenious operative devices.

The Sneyd Collieries Limited, Burslem. Colliery Engr., vol. 1, no. 5, July 1924, pp. 214-230, 23 figs. Illustrated description of typical No. Staffordshire Colliery, with special reference to some of re-equipment work being carried out.

Equipment. New Equipment Shown at Cincinnati Convention, F. H. Kneeland. Coal Age, vol. 25, no. 21, May 22, 1924, pp. 772-777, 16 figs. Describes exhibits of pumps, car greasers, track equipment, locomotives, cars and car dumps, shown at machinery exposition of coal mining convention.

Explosion Prevention. Coal-Mine Explosions and Their Prevention, H. F. Bain. Monthly Labor Rev., vol. 18, no. 6, June 1924, pp. 10-14. Experiments carried out by Bur. of Mines.

Is Mud Equal to Rock Dust For Mine Protection? Coal Age, vol. 26, no. 12, Sept. 18, 1924, pp. 391-394, 5 figs. W. J. Reid, superintendent of Lion Coal Co.'s mine at Wattis, Utah, with plenty of air-slacked shale at hand saves grinding costs by mixing dirt with water and spraying it through rooms and entries from home-made pumping machine.

See also Rock Dusting.

Explosions. Benwood Explosions Shows Need for Stricter and More Uniform Mining Laws, Rob. M. Lambie. Coal Age, vol. 25, no. 20, May 15, 1924, pp. 728-730, 2 figs. Fire that followed blast at mine of Wheeling Steel Corpn., W. Va., quickly extinguished by sealing off; all-service gas masks prove more advantageous than oxygen apparatus in rescue work; necessity for rock dusting emphasized.

Castlegate Blast Due to Contact of Gas with Open Light. Coal Age, vol. 25, no. 12, Mar. 20, 1924, pp. 431-432, 3 figs. According to preliminary report of disaster of Utah Fuel Co.'s mine, fireboss is believed to have attempted to remove firedamp from room.

Coal-Dust Explosions, W. T. Gotheridge. Can. Inst. Min. & Metallurgy,—Bul., no. 150, Oct. 1924, pp. 626-637. Suggestions for their prevention, and recovery of mines after explosions.

Coal Mine Explosions, W. Moorhead. Coal Mine Mgmt., vol. 3, no. 9, Sept. 1924, pp. 33, 42, 48, 51, 56, and 60. Safety measures employed at mines of Stag Canon Branch of Phelps-Dodge Corpn., Dawson, N. Mex.

Explosion Hazards Incidental to Unwatering Coal Mines. U. S. Bur. Mines—Reports of Investigations, no. 2649, Oct. 1924, 5 pp. Investigation of cases of gas explosion occurring during or very soon after mine was being unwatered; conclusions.

How to Investigate Explosion Hazards, J. W. Paul. Coal Mine Mgmt., vol. 3, no. 7, July 1924, pp. 38-43, 1 fig. Discusses effects of gas, dangerous dusts, dust sampling, sampling rib and timber dust, mine tests, results of sizing tests and explosibility index. Abstract of paper read before W. Virginia Coal Min. Inst.

Maltby Main Colliery Explosion. Colliery Guardian, vol. 127, no. 3296, Feb. 29, 1924, pp. 549-550, 2 figs. See also Iron & Coal Trades Rev., vol. 108, no. 2922, Feb. 29, 1924, pp. 337-340, 1 fig. Chief Inspector's report on causes of and circumstances attending explosion which occurred at Yorkshire, England, July 28, 1923.

Minimizing and Localizing Coal-Mine Explosions, W. C. Holman. Coal Age, vol. 25, no. 18, May 1, 1924, pp. 627-630, 4 figs. Adobe dust was spread several inches deep on main haulage roads throughout all mines of Dawson coal properties

of Phelps-Dodge Corpn., in order to lessen possibility of explosion; dust barriers placed at strategic points; air heated by radiators and humidified by steam and water; undercutter chains and loaded cars sprayed.

Recovery Work After the Castlegate Mine Disaster—What It Taught and Exemplified, A. L. Murray. Coal Age, vol. 26, no. 10, Sept. 4, 1924, pp. 323-326. Recovery of Castlegate No. 2 mine at Castlegate, Utah, following explosion of Mar. 8, 1924, forms excellent example of organization that must be perfected and procedure that is usually followed in recovery of any large mine after a major disaster. Treatment of bodies; establishment of ventilation; testing of apparatus before use; inspection of men on rescue teams.

The Critical Time of Day for Coal-Mine Explosions, L. D. Tracy and M. W. von Bernewitz. U. S. Bur. Mines—Reports of Investigations, no. 2638, Sept. 1924, 5 pp., 1 fig. Study of 256 coal-mine explosions, which occurred during period 1909-1924, and killed 4413 men and injured 570 others, reveals fact that there are two critical times of day when explosions are most likely to occur, and when corresponding care should be exercised to guard against disaster. Critical period in morning ranges between 6 and 9 o'clock, with a peak at 7:30 o'clock, and in afternoon or early evening between 3 and 7 o'clock, with a peak at 6 o'clock. Some discussion of explosions enumerated. (See (abstract) in Modern Min., vol. 1, no. 4, Nov. 1924, pp. 115-116.

Fans. See FANS, Coal-Mine.

Fire Detection. The Application of Gas Analysis to the Detection of Gob Fires, J. T. Storrow and J. I. Graham. Colliery Guardian, vol. 128, nos. 3327 and 3328, Oct. 3 and 10, 1924, pp. 873-874 and 934-935 and Iron & Coal Trades Rev., vol. 109, no. 2953, Oct. 3, 1924, pp. 543-547. Deals with part which careful chemical analysis of underground air samples may play in detection of heatings and following of course of these when they have occurred.

Fire Fighting. How to Make Preparations Against a Fire or an Explosion and What to Do When It Occurs, D. Harrington and M. W. von Bernewitz. Coal Age, vol. 26, no. 20, Nov. 13, 1924, pp. 689-691, 3 figs. Statistics based on 164 disasters of this kind as studied by engineers of Bur. of Mines; 500 lives saved by fan reversal; no lives lost by reversing fans.

Fire Prevention. Some Notes on the Problem of Gob Fires in Thick, Highly Inclined Seams, J. B. de Hart. Can. Inst. Min. & Metallurgy—Bul., no. 142, Feb. 1924, pp. 48-56. Causes and conditions which are inductive of spontaneous heating of coal; study of particular case of thick steeply inclined seams; possibility of ventilating gob; exclusion of air from gob as equally effective method of fire prevention; other possible methods.

Firedamp. See FIREDAMP.

Fires. An Account of a Fire in the Bickershaw Seven Feet Mine at Leigh, Lancashire, and Its Action Upon the Coal, M. Ashurst and F. N. Siddall. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 149-157, 3 figs.

Gob Fire at a North Wales Colliery, J. Valentine. Iron & Coal Trades Rev., vol. 119, no. 2958, Nov. 7, 1924, pp. 739-741, 3 figs. Account of fire at Vauxhall Colliery, Ruabon. (Abstract.) Paper before Nat. Assn. Colliery Mgrs.

Flooding. Redding Colliery Accident. Colliery Guardian, vol. 127, no. 3309, May 30, 1924, pp. 1381-1382, 2 figs. Report of chief inspector of mines, T. H. Mottram, on causes of and circumstances attending inrush of water, which occurred at Redding Colliery, Falkirk, Stirlingshire, Scotland, on Sept. 25, 1923.

France. Restoration Work at Pit No. 11 of the Lens Mines, France. Iron & Coal Trades Rev., vol. 109, no. 2963, Dec. 12, 1924, pp. 960-962, 13 figs. Describes work of reconstruction at pit which had been almost completely destroyed by Germans during world war. Translated from Revue Universelle des Mines.

Galleries. Building a Long Retarding-Conveyor Gallery at Brotherhood Mine, Coal River Collieries (W. Va.), W. J. Denman. Coal Age, vol. 25, no. 7, Feb. 14, 1924, pp. 235-236, 3 figs. Structure rises 800 ft., is in places 40 ft. above ground and 1400 ft. long, maximum grade being 35 deg.; how joints are stiffened and strengthened.

Gas Testing. Ancient and Modern Methods of Testing for Gas in Coal Mines, Geo. O'Brien. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 205-212. The first mine safety lamp; principle of safety lamp; lamps for testing gas; gas indicators.

Gas-Testing Apparatus. Sci. & Art of Min., vol. 34, no. 14, Feb. 2, 1924, pp. 214-215, 2 figs. Details of Clowes' gas chamber which is extensively used at mining schools for demonstrating effects of firedamp or inflammable gases on flame of lamp and for determining composition of residual atmosphere which will extinguish various kinds of flame; and Oldham apparatus also extensively used at coal mines and mining schools for demonstrating purposes.

Germany. Tectonics of Northeastern Border of Lower Siberia Coal Basin and Its Connection With CO_2 Gas Liberation in the Seams (Die Tektonik am Nordostrande des niederschlesischen Kohlenbeckens und ihr Zusammenhang mit den Kohlensäureausbrüchen in den Flözen), S. von Bubnoff. Zeit. für das Berg-, Hütten- u. Salinenwesen, vol. 72, no. 2, 1924, pp. 106-138, 13 figs. Results of geologic examination, especially of Seegen Gottes, Idaschacht, Sophie, Ruben, Rudolf and Wenzeslaus mines.

Tests and Improvements in Mining Operations in Prussia During 1923 (Versuche und Verbesserungen beim Bergwerksbetriebe in Preussen während des Jahres 1923). Zeit. für das Berg-, Hütten- u. Salinenwesen, vol. 72, no. 1, 1924, pp. 1-38, 36 figs. Details of blasting operations, mining methods, maintenance and extension of galleries, conveying, lighting, coke production, briquetting, etc.

Haulage. See COMPRESSED AIR, Coal Mines; MINE HAULAGE.

Haulage-Rope Breakage. The Nunnery Colliery Disaster. Iron & Coal Trades Rev., vol. 109, no. 2954, Oct. 10, 1924, pp. 583-584, 2 figs. Abstract of official report on causes of and circumstances attending underground haulage accident which occurred at mine near Sheffield in December, 1923; conclusions and recommendations.

Head Gears. Colliery Head Gears, J. W. Wardell. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 34-38, 11 figs. Discussion of the various types in ordinary use, with their relative advantages, and features governing their design.

Health Hazards. Is Coal Industry Blind to Health Hazards of Mine? D. Harrington. Coal Age, vol. 26, no. 22, Nov. 27, 1924, pp. 757-761, 2 figs. Author claims that coal mines contribute far more than their share of death and disease; rock dust, water and better ventilation needed.

Holland. The Dutch State Mines (Onze Staatsmijnen), H. A. Van Ysselsteyn. Ingenieur, vol. 39, no. 44, Nov. 1, 1924, pp. 857-864. Report on coal mines of Dutch Nation, covering history, yield, administration, invested capital, profits derived from their exploitation, and wages paid before and after world war.

Humidification. Wetting Down Colorado Mines Is a Real Problem. Coal Age, vol. 25, no. 11,

Mar. 13, 1924, pp. 386-387, 1 fig. Low humidity in high and dry region makes dust serious menace; C. F. & I. Co. humidifies with both live and exhaust steam and sprinkles lavishly.

Hungary. Coal Fields of Agram United Mining and Metallurgical Works (Das Zagorjanische Kohlengebiet der Vereinigten Berg- und Hüttenwerke A. G. in Zagreb), A. Hueber. Montanistische Rundschau, vol. 16, no. 18, Sept. 16, 1924, pp. 485-487. Discusses geologic formation, mining, and analyses of coals, lignites, and dry distillation products.

The Collieries of the First Danube Steam Navigation Company (D.D.S.G.), Near Pécs (Fünfkirchen), Hungary, J. Herczegh. Instn. Min. Engrs.—Trans., vol. 68, part 2, Nov. 1924, pp. 175-193 and (discussion) 193-196, 19 figs. Description of mining practice of Hungarian Liassic coalfields, including geological observations; central coal-washing, screening, and briquetting plant, and electric power station at Ueszög; coal transportation; conditions of working coal; shafts and winding gear; surface machinery; welfare and housing; etc.

Hydraulic Filling. Hydraulic Filling Plants in Erz Mountain Coal Mines at Zwickau (Die Spülversatzanlagen des erzgebirgischen Steinkohlen-Aktienvereins in Zwickau), F. Schwartz. Glückauf, vol. 60, nos. 44 and 45, Nov. 1 and 8, 1924, pp. 999-1003 and 1032-1037, 5 figs. Gives reasons for using hydraulic filling; production and conveying of filling sand; arrangement and operation of hydraulic plants; advantages of hydraulic mining.

India. Coal Mining in India. Colliery Engr., vol. 1, no. 5, July 1924, pp. 243-247, 9 figs. Illustrated account of conditions and methods of working in Indian coalfields.

Labor-Saving Equipment. Cost-Cutting Suggestions for the Mine Executive, E. Healy. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 678-680, 5 figs. Savings in past testify to possibilities of present; automatic equipment saves labor, eliminates accident, and is more dependable than station tender; super-power practice adaptable to mine conditions.

Lighting. Productive Lighting for Coal Mines, C. E. Egeler. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 4-7, 7 figs. Importance of better illumination underground; type of equipment needed for various sections of mine.

Management. "Balanced Mines" Should Have Rock-Bottom Costs, Chas. E. Anderson. Coal Age, vol. 25, no. 18, May 1, 1924, pp. 637-640, 2 figs. It is shown that everything about a mine can be balanced and each department must be coördinated with all others if lost motion is to be avoided; describes efficient mine-balance system.

Too Much Around a Coal Mine Is Left to Chance. Coal Age, vol. 25, no. 4, Jan. 24, 1924, pp. 137-138, 1 fig. Production losses at tipple; supervision underground; correlation of mining operations. From report on Underground Management in Bituminous Mines, made by S. E. Thompson and Associates to U. S. Coal Commission.

Mexico. A Modern Coal Mine in Mexico, J. B. Robinson. Coal Industry, vol. 7, no. 3, Mar. 1924, pp. 116-118, 4 figs. Mining and preparation practice at large Mexican mine of Sabinas Co.; coal coked in beehive ovens and sold locally.

Mine-Rescue Work. See MINE-RESCUE WORK.

Mudcapping. Danger in Using Permissible Explosives for Mudcapping in Dry and Dusty Coal Mines, W. J. German. Du Pont Explosives Service Bul., no. 9, Mar. 1924, 3 pp., 2 figs. A permissible is not a permissible when fired in the open.

Nova Scotia. Dominion No. 1 B. Colliery, Glace Bay, Cape Breton, J. Moffat. Can. Min. Jl., vol. 45, no. 40, Oct. 3, 1924, pp. 976-979, 4 figs. Mining method, coal-cutting machines, ventilation, pumping arrangements and underground haulage at coal mine in Nova Scotia.

Open-Lamp Hazards. The Danger of Open Lamps in Coal Mines, L. C. Ilsley and M. W. von Bernewitz. U. S. Bur. Mines—Reports of Investigations, no. 2567, Jan. 1924, 3 pp. Discusses hazards.

Pennsylvania. Bituminous Coal Losses and Mining Methods in Pensylvania, Jas. D. Sisler. Pennsylvania Geol. Surv., 4th series, 1924, 216 pp., 30 figs. Topography and geology of Pennsylvania bituminous coal field; method of studying coal losses; causes of coal losses; coal reserves; Pittsburgh steam coal, gas coal, coking coal districts; other districts.

Pit Temperatures. Pit Temperatures and their Possible Modification, F. Heise and K. Drekopf. Colliery Guardian, vol. 128, nos. 3323 and 3324, Sept. 5 and 12, 1924, pp. 612-613 and 678-679, 4 figs. Analysis of various factors exerting decisive influence on pit temperatures and examination of possibility of artificially modifying these conditions; chief factors are prevailing day temperature; heat due to compression; rock temperature; equalizing zone; absorption or deposition of water vapor; and formation of CO_2 through oxidation of coal or wood. Translated from Glückauf.

Power. Power Studies in Illinois Coal Mining, A. J. Hoskin and T. Fraser. Univ. of Ill.—Bul. no. 144, July 1924, 80 pp., 3 figs. Power problem in Illinois mines; uses of steam and electricity in Illinois coal mines; characteristics of typical mines selected for study; power consumption by various mining activities; power requirements at mixed-power mines; comparison of estimated with metered power consumption figures; public-utility power at Illinois mines; public-utility rates; and principal factors that affect power costs in mining.

Power Distribution. A Direct-Current Power-Distributing System that Keeps the Mine Equipment Working, R. Howey. Coal Age, vol. 26, no. 5, July 31, 1924, pp. 152-154, 3 figs. Need for higher operating efficiencies has created demand for automatic devices; troubles in power circuit are localized so that serious delays cannot occur.

Power Plants. A Modern Colliery Power Plant, S. Wales Inst. Engrs.—Proc., vol. 39, no. 7, and vol. 40, no. 2, Feb. 21, and May 8, 1924, pp. 772-794, and 77-92. Discussion of paper by E. L. Hann published in Proc., vol. 39, no. 5, p. 583.

Illinois Mine Generates Own Power Cheaply, A. Allen and H. F. Hebley. Coal Age, vol. 26, no. 1, July 3, 1924, pp. 3-7, 4 figs. Describes power plant of No. 4 mine of Donk Bros. Coal & Coke Co., in Madison County, Ill. All pickings and some slack burned; superheated steam used; exhaust from hoist and auxiliaries utilized in mixed-pressure turbine. Costs reduced to 1.6 cents per kw-hr. with plant at half capacity. Mine has a daily hoisting capacity of 6000 tons.

See also STEAM-ELECTRIC PLANTS, Coal-Mine.

Power Purchasing. Making Power Contracts That Will Save Your Purse, W. H. Russell. Coal Age, vol. 26, no. 13, Sept. 25, 1924, pp. 437-438. Discusses schedule under which power should be purchased. Power schedules should be selected with care; large savings often can be made by buying under two schedules; contract must be based on intimate knowledge of conditions at mine to be supplied.

Production and Labor, United States. Production and Labour in United States Coal Mines, E. T. Devine. Int. Labour Rev., vol. 10, nos. 5 and 6, Nov. and Dec. 1924, pp. 759-778 and 935-961. Report of U. S. Coal Commission of 1922-1923. Nov.: Account of Coal Commission and description of anthracite industry. Dec.: Bituminous coal industry, and recommendations.

Pumping. Present Day Pumping Practices in Anthracite Mines, E. J. Falloon. Modern Min., vol. 1, no. 2, Sept. 1924, pp. 32-40, 9 figs. Summary of some of the high points in preseat-day practices and tendencies. A properly applied system of pumping not only saves labor and power, but insures continuous mine operation.

Pumping Plants. See PUMPING PLANTS, Mines.

Quantity of Waste, Determination of. Determining by Volumetric Tests the Quantity of Unmarketable Material in a Coal Seam, H. Owens. Coal Age, vol. 25, no. 13, Mar. 27, 1924, pp. 465-466, 2 figs. Displacement tank used to obtain volume of the various sizes of coal shipped; volume of coal in solid calculated from mine maps and compared with volume shipped to market.

Refuse Disposal. The Mechanical Disposal of Colliery Spoil, G. F. Zimmer. Colliery Engr., vol. 1, no. 7, Sept. 1924, pp. 328-333, 9 figs. Survey of various methods of handling refuse by aerial ropeways, with special reference to jig-back type.

Rescue Apparatus. See MINE-RESCUE APPARATUS.

Research. Progress in Mining Technique, D. Adam. Colliery Engr., vol. 1, no. 5, July 1924, pp. 210-212. Discusses fields of research other than safety, especially transportation of coal from face to pithead and its ramifications.

Rhodesia. The Wankie Colliery, Southern Rhodesia. Iron & Coal Trades Rev., vol. 109, no. 2943, July 25, 1924, pp. 151-152 and 172-174, 12 figs. Discusses general layout and equipment, including ventilation, haulage, coal preparation, coke ovens, etc.

Rock Dusting. Dr. Wheeler Explains That Wet Coal Dust Is Still Coal Dust and Liable to Explode. Coal Age, vol. 25, no. 12, Mar. 20, 1924, pp. 423-427, 1 fig. Extracts from lectures given by R. V. Wheeler, dealing with factors which enter into gas and coal-dust explosions, placing greatest emphasis on prevention of latter by rock dusting.

How Old Ben Corporation with Rock Dust Extinguished Seven Mine Explosions, J. E. Jones. Coal Age, vol. 25, no. 25, June 19, 1924, pp. 907-911, 6 figs. See also Coal Industry, vol. 7, nos. 5 and 6, May and June 1924, pp. 191-197, 4 figs, and 243-246. Zone system vs. coating system; relative advantages of floor, rib and roof dust; frequencies of application; effectiveness of dust distributed by air current; sampling by vacuum cleaner.

Limestone's Advantages for Rock-Dusting, H. H. Brandon. Explosives Engr., vol. 2, no. 7, July 1924, pp. 235-237, 3 figs. Mines in various sections of country are adopting practice for rock dusting; many quarries can supply coal mines with pure pulverized limestone at attractive price.

M-S-A- Rock Dust Distributor, T. G. Fear. Coal Trade Bul., vol. 51, no. 9, Oct. 1, 1924, pp. 389-390, 6 figs. Description of car.

Machine in Royal Mine Makes Dust and Distributes It, S. Tescher. Coal Age, vol. 26, no. 22, Nov. 27, 1924, p. 756, 1 fig. Results of 6 months' experimenting with rock-dusting equipment at mine in Colorado; relies on ventilation to carry dust over 1000 ft. of space; dust barrier formed at each machine location.

Methods of Rock Dusting Bituminous Mines, E. Steidle. Coal Age, vol. 26, no. 24 and vol. 27, no. 1, Dec. 11, 1924, and Jan. 1, 1925, pp. 825-829 and 6-16, 8 figs. See also Modern Min., vol. 1, no. 5, Dec. 1924, pp. 126-134, 6 figs. Dec. 11: Rock Dusting as means of preventing and limiting mine explosions; practical application; testing. Jan. 1, 1925; Rock dust for mine protection, fire fighting, shot stemming and cushioning.

Pittsburgh Coal Co. Evolves Dust Distributor, A. F. Brosky. Coal Age, vol. 26, no. 25, Dec. 18, 1924, pp. 865-867, 5 figs. Nozzle of rock-dust distributor projects dust to all surfaces in proper proportion; mechanical mule draws train at suitable speed for complete distribution in one application.

Rock Dust No Cure-All, Say Western Engineers, E. W. Davidson and A. F. Brosky. Coal Age, Vol. 26, no. 23, Dec. 4, 1924, pp. 783-788, 7 figs. Development of rock dusting in the West; high-pressure dusting wins favor; mud-spraying experiments.

Rock Dust Stemming vs. Air Spacing, H. Petersen. Explosives Engr., vol. 2, no. 7, July 1924, pp. 219-223, 10 figs. Report of recent tests made at Black Hawk Mine of U. S. Fuel Co., Hiawatha, Utah.

Rock Dusting. Min. Congress Jl., vol. 10, no. 7, July 1924. Contains following papers read at Am. Min. Congress: Actual Experiences With and Tried Methods of Applying Rock Dust, J. E. Jones, pp. 291-293, 1 fig.; Occurrence, Characteristics and Behavior of Coal Dust, J. W. Paul, pp. 294 and 302, 1 fig.; Investigations Into Rock Dusting for Coal Dust Explosion Prevention, G. S. Rice, pp. 295-296, 1 fig.; Rock Dusting of Coal Mines: Efficacy, Methods and Costs, J. T. Ryan, pp. 297 and 302; Rock Dust Versus Water as a Preventive Measure for Mine Explosions, E. Steidle, pp. 298 and 302.

Rock Dusting of Bituminous Coal Mines, E. Steidle. Coal Mine Mgmt., vol. 3, no. 7, July 1924, pp. 23-33, 2 figs. Also Coal Industry, vol. 7, no. 7, July 1924, pp. 279-283, and Explosives Engr., vol. 2, nos. 7, 8, and 9, July, Aug., and Sept. 1924, pp. 240-242, 280-283, and 302-305, 8 figs. Discusses mine explosions, theory of coal-dust explosion, preventive measure, effect of watering coal dust, application, theory of rock dusting, examination of coal dust hazard, raw materials for rock dust, crushing and pulverizing, dust distributor, sampling rock dust areas, rock dust barriers and costs. Abstract of paper read before W. Virginia Coal Min. Inst.

Rock Dusting of Coal Mines, T. G. Fear. Coal Mine Mgmt., vol. 3, no. 7, July 1924, pp. 43-44 and 62-65. See also Coal Trade Bul., vol. 51, no. 9, Oct. 1, 1924, pp. 387-388. With use of permissible explosives, lamps and machinery, rock dust stemming and rock dusting of mines, coal-dust explosions can be controlled and practically eliminated. Abstract of paper read before Coal Mine Safety Conference, St. Louis.

Rock Dusting of Coal Mines: Efficacy Methods and Costs, J. T. Ryan. Coal Industry, vol. 7, no. 6, June 1924, pp. 241-242. Equipment necessary at mine to pulverize and spread dust; estimate for 400,000-ton mine installation.

Rock-Dusting Machine with Three Fixed Outlets Treats Roof and Ribs. Coal Age, vol. 26, no. 4, July 24, 1924, pp. 127-128, 2 figs. Particulars of Miller mine-dusting machine. Is mounted on a single truck and does not need services of a nozzleman. Dust does not pass through fan.

Rockies Are Full of Ingenious Dusting Machines. Coal Age, vol. 26, no. 13, Sept. 25, 1924, pp. 427-430, 8 figs. Describes home-made devices employed in Rocky Mountain coal mines for applying inert dust, employing various principles. Uniform feed difficult to assure.

Shale Dusting Now Spreading Rapidly in Illinois. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 683-688, 6 figs. Many companies follow lead of Old Ben Coal Corpn., where dusting system got its greatest impetus; methods employed.

Stone Dusting, J. A. S. Ritson. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 663-668, 8 figs. Legal requirement which helps Great Britain to

keep fatality rate one-third as large as ours; methods employed in dusting.

Stone Dusting to Prevent Mine Explosions. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 97-98. Discusses methods of distribution, fine or coarse, effect on health, situation in America; etc.

Tentative Specifications for Rock Dusting to Prevent Coal-Dust Explosions in Mines, G. S. Rice, J. W. Paul and R. R. Sayers. U. S. Bur. Mines—Reports of Investigations, no. 2606, May 1924, 6 pp. Also Coal Industry, vol. 7, no. 7, July 1924, pp. 273-275; and Coal Mine Mgmt., vol. 3, no. 7, July 1924, pp. 45-48 and 66. Discussing size of particles, character of rock dust, amount of dust required, redusting, allowable combustible matter, sampling, analysis of samples and extent of rock dusting necessary.

The Effects of Dust Inhalation in Mines, J. S. Haldane. S. Wales Inst. Engrs.—Proc., vol. 39, no. 6, Feb. 2, 1924, pp. 685-709 and (discussion) 709-722. Describes serious dangers which arise under certain conditions from inhalation of stone dust in mines, and explains evidence that in coal mines these dangers do not exist naturally, provided that suitable material is used for stone dusting and that stone dust is applied in such manner as not to expose men to excessive inhalation of dust.

Using Rock Dust in Shotholes to Lessen Violence and Increase Lump Coal, J. H. Horlick, Jr. Coal Age, vol. 25, no. 22, May 29, 1924, pp. 805-806. Explosive is laid loose in shothole and above it cartridges of rock dust are placed; dust is compressed, reducing violence of blast; flame of shot is extinguished by shower of dust.

What Kind of Rock Dust Should Be Used in Mines? Geo. S. Rice, J. W. Paul and R. R. Sayers. Coal Age, vol. 25, no. 24, June 12, 1924, pp. 876-878. Fifty per cent should pass through 200-mesh screen; smaller percentage may be this fine under certain conditions; some mines need 75 per cent of non-combustible; effect of methane.

See also COAL DUST, Explosions.

Rock Pulverizing Unit. Planning an Efficient Rock Pulverizing Unit, L. H. Sturtevant. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 647-649, 5 figs. Should have preliminary crusher, possibly dryer, and pulverizer of at least 1 ton per hr. capacity producing dust of 95-per cent 60-mesh and 60-per cent 200-mesh fineness.

Safety. "Make It Safe," A. W. Dickinson. Coal Industry, vol. 7, no. 3, Mar. 1924, pp. 108-111, 4 figs. Slogan in use at mines of Union Pacific Coal Co.; measures taken to promote safety of employees.

Mine Safety Due for a Boom in Illinois When New State Council Sets Pace for National Drive. Coal Age, vol. 26, no. 2, July 10, 1924, pp. 42-46, 3 figs. Discussion on mine safety which took place at meeting, engineered by Nat. Safety Council's mining section, of 100 coal-mining men, in St. Louis. Discussion ranged from rock dusting and ventilation down to exact way in which black damp kills a man.

Mine Safety Methods of the Ford Collieries Company, C. L. Colburn. Nat. Safety News, vol. 10, no. 1, July 1924, pp. 31-33, 4 figs. Company operates 3 mines employing about 1000 men. Management accomplishes marvelous results by watchword "Safety First."

Rocky Mountain Institute Lays Down Safety Code. Coal Age, vol. 26, no. 9, Aug. 28, 1924, pp. 289-292, 3 figs. Rules and regulations submitted in report of Rocky Mountain Coal Mining Inst. Coal-mining authorities of Colorado, New Mexico, Utah, and Wyoming believe in more observance rather than in more law. Declare for rock dusting and sprinkling. Want constant educational campaign.

Shaft Sinking. See SHAFT SINKING.

Shafts. Location of. Location and Size of Shafts. Sci. & Art of Min., vol. 34, nos. 22 and 23, May 24 and June 7, 1924, pp. 338-339 and 358. Preliminary operations; quality of coal found in various seams; existence of faults or other geological disturbances; nature of surface deposits; factors governing position of shafts.

Shale Dusting. See Rock Dusting.

Signaling. See MINE SIGNALING.

Silt Recovery from Breaker Slush. Recovering Silt from Breaker Slush, P. Sterling. Coal Industry, vol. 7, no. 2, Feb. 1924, pp. 85-86, 4 figs. Improved method for recovering solids from anthracite breaker slush; prevents stream pollution and provides fuel for use at future date; describes installation of Dorr thickener at Drifton, Hazleton Shaft and Sayre collieries.

Spontaneous Combustion in. Spontaneous Combustion in Coal Mines, J. I. Graham. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 27-31, 3 figs. Survey of underlying causes of this trouble, with indications of practical preventative methods.

See also Acid Water in.

Squeeze in Pitching Seams. The Cause of and Methods of Combating Squeeze in Pitching Seams, Wm. G. Heeley. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 707-710, 2 figs. Describes experience gained and explains deductions made from phenomenon of great squeeze which occurred at Brule mines, Alta.

Stone Dusting. See Rock Dusting.

Strikes. See STRIKES.

Substations for. See SUBSTATIONS, Coal-Mine.

Surface Plant. New Surface Plant at Barrow Colliery, Barnsley. Iron & Coal Trades Rev., vol. 109, no. 2948, Aug. 29, 1924, pp. 341-343 and 353-356, 17 figs. Gives description of rearranged surface plant at Barrow Colliery of Barrow Hematite Steel Co., Ltd. and general layout.

Underground Management. How Miner and Manager, Each with His Immediate Ends in View, Hamper Coal Production, S. E. Thompson. Coal Age, vol. 25, no. 11, Mar. 13, 1924, pp. 383-385, 5 figs. Discusses lack of coöperation between miner and management; points out that effect of two-shift work should be carefully studied in every mine from standpoint of economical management, equipment, development, and personnel.

Valuation. Estimating Coal Mine and Coal Land Valuations, H. B. Miller. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 21-25. Factors to be considered when making valuation; outline for report on coal mine in connection with valuation.

The Principles of Coal Property Valuation, A. W. Hesse. Coal Mine Mgmt., vol. 3, no. 1, Jan. 1924, pp. 44-48. Values on assured, probable and possible coals.

Valuation of Coal Mining Properties in the United States. Am. Inst. Min. & Met. Engrs.—Trans., no. 1290-C, Jan. 1924, 11 pp., 5 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 32-33. Report of Engrs.' Advisory Valuation Committee of U. S. Coal Commission.

Valuation of Coal Properties, G. M. S. Tait. Min. & Metallurgy, vol. 5, no. 205, Jan 1924, pp. 11-12. Basis of valuation. Geographical situation a deciding factor.

Ventilation. Coal Mine Ventilation, Jos. B. de Hart. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 620-625. Discusses two papers by Douglas Hay and Rob. Clive, forming reports of committee on ventilation of mines, appointed by Midland Inst. Min. Engrs.

Resistance of Mine Headings To the Flow of Air, J. W. Paul, G. E. McElroy and H. P. Greenwald. Coal Age, vol. 26, no. 13, Sept. 25, 1924, p. 441. Notes on tests made by U. S. Bur. Mines in connection with research on coal-mine ventilation factors. In smooth roadway coefficient only 0.000,000,003,6; rough floor will add 10 per cent; cutting out crosscuts reduced friction 6 per cent.

Tests on the Leakage of Mine Ventilating Doors, J. W. Paul, G. E. McElroy and H. P. Greenwald. U. S. Bur. Mines—Repts. of Investigations, no. 2602, May 1924, 3 pp. Particulars of tests made to determine leakage of two air locks which had been placed in experimental mine as part of equipment for tests on friction factors.

The Resistance of Coal-Mine Entries to the Flow of Air, J. W. Paul, C. E. McElroy, and H. P. Greenwald. U. S. Bur. Mines—Reports of Investigations, nos. 2621 and 2647, July and Aug., 1924, 6 pp. See also Coal Mine Mgmt., vol. 3, no. 9, Sept. 1924, pp. 49-51. No. 2621: Deals with resistance of unobstructed entries; test method and results; no. 2647: resistance caused by mine cars.

The Ventilation of Mines, D. Hay and R. Clive. Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1058-1061, 6 figs. Discusses objects and principles of ventilation, splitting of air, regulation of splits, influence of leakage, size of airway, and natural ventilation effect. From paper read before Min. Sec. Empire Min. & Met. Congress.

Ventilation and Dust Control, D. D. Wilcox. Coal Mine Mgmt., vol. 3, no. 8, Aug. 1924, pp. 21-25, 1 fig. Discusses leaky stoppings, reducing resistance, improving circulation, and reducing amount of dust. Abstract of paper read before Coal Mine Safety Conference.

Ventilation in Cape Breton Collieries, J. Moffatt. Can. Min. Jl., vol. 44, no. 48, Nov. 30, 1923, pp. 943-944. Ascensional system now being organized in collieries of Dominion Coal Co.

Waste-Heat Ventilation (Abdampfbewetterung), H. Kegel. Braunkohle, vol. 22, no. 40, Jan. 5, 1924, pp. 613-616, 3 figs. Refers to work by F. Heise, published in same journal (no. 29, 1923), on possibility of utilizing heat from exhaust steam for production of air current in deep mines, and discusses possibility of applying waste-heat ventilation in lignite mines.

See also FANS, Mine.

Wales. The Llantrisant and Llanharan Sinkings. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 15-27, 15 figs. Particulars of modern equipment already erected by Powell Duffryn Steam Coal Co. Ltd., Wales, and of plans prepared for future development.

Wembley Exhibition, England. Wembley Exhibition Colliery, H. M. Crankshaw. Colliery Guardian, vol. 127, no. 3296, Feb. 29, 1924, pp. 533-538, 24 figs. See also Iron & Coal Trades Rev., vol. 108, no. 2922, Feb. 29, 1924, pp. 354-355, 1 fig.; and Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 43-49, 6 figs. Description of equipment of a full-sized coal mine equipped with plant representative of best British mining practice, most attractive feature at Wembley exhibition in England.

See also British Empire Exhibition.

Winding Engines. See WINDING ENGINES.

COAL MINING

Alabama. Alabama Coal Mining Practices, M. H. Fies. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1370-C, Sept. 1924, 49 pp., 26 figs. and (abstract) Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 487-490, 3 figs. See also Coal Age, vol. 26, nos. 14 and 15, Oct. 2 and 9, pp. 473-478 and 509-512, 12 figs. Production and other statistics; detailed description of mining methods; ventilation; pumping; haulage; mine cars and dumps; describes Ramsay mine-run sampler; safety.

A. C. vs. D. C. Operation. A. C. Versus D. C. in Mine Operation, R. Trautschold. Coal Industry, vol. 7, no. 2, Feb. 1924, pp. 83-84. Alternating current favored for all operations except haulage; 3-phase, 60-cycle current most widely used.

Alamo Mine, Col. Steeply Pitching Coal Beds, Undercut by Machine, Are Tapped by Slope in Shales Below Them, C. M. Schloss. Coal Age, vol. 25, no. 13, Mar. 27, 1924, pp. 451-454, 5 figs. Description of Alamo coal mine in Colorado and details of mining operations; seam gradient 58 per cent; slope will not cut seam till it has been driven 2600 ft. but a slant is provided to tap coal 1900 ft. from portal.

Arc-Walling Machine. Sullivan "Arkutter" at St. Helen's Colliery. Iron & Coal Trades Rev., vol. 109, no. 2951, Sept. 19, 1924, p. 481, 2 figs. Describes arc-walling machine consisting of Sullivan longwall electrically operated coal cutter mounted upon special fitting trolley so arranged that full width of heading is cut by jib being slewed through over 180 deg. while machine remains attached to trolley.

The Mavor and Coulson Arcwell Machine. Colliery Guardian, vol. 128, no. 3328, Oct. 10, 1924, pp. 937-938, 2 figs. Working results which give good idea of method in operation.

Australasia. Coal-Mining Practice in Australasia. Iron & Coal Trades Rev., vol. 108, no. 2939, June 27, 1924, pp. 1107-1110. See also Indus Australia & Min. Standard, vol. 72, no. 1865, Sept. 4, 1924, pp. 360-361. Coal resources and coal-mining methods in New South Wales, Victoria, South Australia, and New Zealand. Abstract of paper read at Min. & Met. Congress, Eng.

Beckley Bed, W. Va. Limitations and Eccentricities of the Beckley Coal Bed and How Best to Offset Them, C. R. Stahl. Coal Age, vol. 25, no. 14, Apr. 3, 1924, pp. 485-489, 4 figs. Difficulties of mining coal bed in Raleigh County, W. Va.; pumping, haulage and supervision problems.

Bituminous, Timber Used in. Timber Used in Bituminous-coal Mining, N. G. Alford. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1336-C, May 1924, 5 pp., 4 figs. Table showing timber used in bituminous coal mining in United States; estimated 1923 and future timber consumption in bituminous-coal mining; curves showing past and estimated future fuel consumption and production, including anthracite and bituminous coal, oil and gas.

Blasting. A Necessary Safety Condition for Blasting Inflammable Media (Sur une condition nécessaire de la sécurité du minage en milieu inflammable), E. Audibert. Académie des Sciences —Comptes Rendus, vol. 179, no. 17, Oct. 27, 1924, pp. 825-827. Discusses residual reactions which for safety should be completed before gases taking part make contact with exterior atmosphere.

Getting the Best Results With Permissible Explosives, J. Towal. Du Pont Explosives Service Bul., no. 6, Feb. 1924, 3 pp., 3 figs. See also Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 161-163, 3 figs. Some ways and means of producing lump coal.

How Dangerous Ground Currents Were Prevented and Confidence of Workmen Regained, Emory E. Jones. Coal Age, vol. 26, no. 17, Oct. 23, 1924, pp. 574-576, 5 figs. Stray currents were eliminated from shaft and equipment by interconnecting cables; leads on firing caps should be short-circuited until used; damaged blasting

cables must be replaced at once; results of tests made to determine exact cause of premature explosion in mine during shaft sinking.

Rock-Dust Stemming, J. H. Horlick, Jr. Explosives Engr., vol. 2, no. 6, June 1924, pp. 189-192, 4 figs. Produces more lump coal, requires less explosives, and increases safety.

Safety in Shot Firing in Inflammable Media (La sécurité du tir en milieu inflammable), E. Audibert. Annales des Mines, vol. 6, no. 8, Aug. 1924, pp. 63-128, 10 figs. Report presented to Research Commission on firedamp and explosives used in mines, discussing methods of testing, flames and heating produced by detonation, velocity of decomposition of solid explosives, etc.

Some Blasting Suggestions For Coal Miners, R. Z. Virgin Coal Trade Bul., vol. 50, no. 9, Apr. 1, 1924, pp. 390-391, 5 figs. Explosives used, cutting of fuse, caps or detonators, attaching detonator to fuse, piercing explosive to receive cap, igniting charge.

The Production of More Merchantable Coal J. W. Koster. Du Pont Explosives Service Bul., May 1924, 4 pp., 4 figs. Factors in blasting coal with permissible explosives which can be controlled by mine officials and which are vital in production of a merchantable product.

The Proper Use of Permissibles, G. Evans. Modern Min., vol. 1, no. 3, Oct. 1924, pp. 64-66, 5 figs. Helpful points on blasting practice in anthracite field.

The Rock-Dust Cartridge Method of Stemming Shots, H. M. Roscoe. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 638-642, 4 figs. Explains method and points out its advantages.

Why Cushioned Blasting Increases Lump Coal Production, J. Barab. Explosives Engr., vol. 2, no. 12, Dec. 1924, pp. 415-419 and 425, 3 figs. Discusses permissible explosives, results of tests on cushioned blasting, and theory of cushioning.

See also Shot Firing; BLASTING, Coal Mines; Electric.

Block System. Block System of Mining Coal Has Many Advantages, H. R. Bissell, Coal Age, vol. 26, no. 18, Oct. 30, 1924, pp. 613-614, 4 figs. Claims that it reduces danger, increases percentage of extraction and results in coarser, cleaner output; room-and-pillar mines can be converted to block method mainly by widening centers.

Boring. Boring in Frozen Strata, R. L. A. Dron. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 186-191, 2 figs. See also (abstract) in Iron & Coal Trades Rev., vol. 108, no. 2929, Apr. 18, 1924, p. 633; and Colliery Guardian, vol. 127, no. 3303, Apr. 17, 1924, p. 1005, 2 figs. Describes difficulties met with in boring at coal field in Spitsbergen.

Coal-Cutting Machines. Adapting Shortwall Machine to Center Cutting. Coal Age, vol. 26, no. 21, Nov. 20, 1924, p. 725, 3 figs. Undercutter can be mounted on truck so as to cut kerf from 1½ to 2½ ft. or from 3 to 4 ft. above track.

Chain Coal Cutters (Kettenschrämmaschinen), Wimmelmann. Bergbau, vol. 37, nos. 28 and 29, Nov. 27 and Dec. 4, 1924, pp. 705-707 and 725-727. Details of pick-quick machines, bar and chain cutters, including operation and efficiency; advantages and disadvantages of new chain cutter.

Coal-Cutters in India. Iron & Coal Trades Rev., vol. 108, no. 2922, Feb. 29, 1924, pp. 350-351 (includes discussion), 5 figs. Review of paper by Case read before Assn. Colliery Mgrs. in India. Merits of disk, bar, and chain types; "out-put" Shortwall cutter; care and maintenance of coal cutters.

Coal-Cutting at the United Westminster and Wrexham Collieries, Ltd. Iron & Coal Trades Rev., vol. 109, no. 2957, Oct. 31, 1924, p. 710, 4 figs. Maintenance costs of machines, both electric-motor and air-driven, working under entirely different conditions, at Wrexham and Gresford collieries.

Coal Stripper Uses Ice Harvesters' Method, D. M. Sutor. Coal Age, vol. 25, no. 12, Mar. 20, 1924, pp. 415-417, 4 figs. Turns longwall cutting machine on edge, "sawing" 28-in. seam into panels 12 ft. wide so that pop shots make less screenings; scheme reduces overall cost of coal.

Correct Forging and Tempering Methods Double the Life of Undercutting-Machine Bits, A. F. Brosky. Coal Age, vol. 25, no. 1, Jan. 3, 1924, pp. 3-5, 3 figs. At Lynch operation of United States Coal & Coke Co. 1800 cutter bits are given correct shape, sharp point, and correct temper every working day and only three men are employed in this service; how cost records are kept.

Cross-Cutter Operation with Hela Cross-Cutter Rods on the Sälzer-Neuack Mine (Essen, Germany) (Schrämmaschinenbetrieb mit Hela-Schrämstangen auf der Zeche ver. Sälzer-Neuack), M. Wemmer. Glückauf, vol. 60, no. 14, Apr. 5, 1924, pp. 255-260, 6 figs. Describes design and operation of cross-cutter and reasons for its adoption.

Effect of Mechanical Coal Mining on the Output of Cutters (Die Einwirkung der Maschinenmässigen Kohlengewinnung auf die Hauerleistung), J. Cloos. Glückauf, vol. 60, no. 49, Dec. 6, 1924, pp. 1144-1146. From statistics of Helene and Amalie mines shows that introduction of machines has not increased output per man, as expected.

Longwall Coal-Cutting Machines and Standardisation. Colliery Engr., vol. 1, no. 3, May 1924, pp. 146-147, 1 fig. Commentary upon diverse conditions in which they operate and consequent impossibility of attaining maximum efficiency with standardized designs.

New Coal-Cutting Machine Drives Gangways, A. Gerke. Coal Age, vol. 25, no. 7, Feb. 14, 1924, pp. 240-242, 4 figs. Describes Rotatia machine; same device cuts, breaks, and delivers product; entries may be driven on both sides of main gangway.

Radial Percussive Coal-cutters. Sci. & Art of Min., vol. 34, no. 17, Mar. 15, 1924, pp. 266-267, 4 figs. Describes Hardiax cutter, operated by compressed air; is of reciprocating type, and supported in position for cutting by a vertical column fixed between roof and floor of seam.

Re-sharpening of Coal-Cutter Picks. Colliery Engr., vol. 1, no. 4, June 1924, pp. 166-167. Few practical hints on heat treatment of steel to secure a maximum amount of service.

Tests of Coal Cutters by the Loire Mining Co. (Sur les essais de haveuses à la Compagnie des mines de la Loire), M. Saint-Andre. Revue de l'Industrie Minérale, no. 85, July 1, 1924, pp. 341-352, 7 figs. Discusses report on mechanical coal cutters, showing saving in cost and explosives, and increased output.

The Economic Aspect of Winning Coal Without the Aid of Explosives, E. H. Oliver. North of England Inst. Min. & Mech. Engrs.—Trans., vol. 74, part 2, Jan. 1924, pp. 34-38 and (discussion) 38-40, 2 figs. Describes "Murton" gearing which combines both horizontal and vertical movement of percussive coal-cutting machine. See also (discussion) in part 3, Mar. 1924, pp. 51-53.

See also Arc-Walling Machine.

Colorado, 1923. Coal Mining in Colorado During 1923, Chas. M. Schloss. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 50-52, 5 figs. Economic conditions and technical developments.

Conveyors. See COAL HANDLING, Conveyors.

Cutting, Vertical. Vertical Cutting, T. A. Stroup. Coal Mine Mgmt., vol. 3, no. 9, Sept. 1924, pp. 21-27, 5 figs. Particulars of tests made over a period of 90 days in summer of 1921 to investigate general economics, if any, that might result from introduction of vertical cutting as a standard practice into Clear Creek Mines, Utah.

Developments, 1923. Engineering Achievements Outstanding Features of Mining Progress in 1923, E. J. Gealy. Coal Age, vol. 25, no. 3, Jan. 17, 1924, pp. 77-78. Greater use of mechanical and electrical horsepower; increased application of automatic equipment; higher efficiencies in material handling.

Developments, Great Britain. Developments and Tendencies in British Coal Mining, Jas. Cooper. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 46-49. Thinner seams are being worked, and more mechanical equipment used, especially conveyors; investigations in dust explosions and mine lighting feature safety work.

Dump and Picking Methods. Dudley Mine's Unusual Dump and Picking Methods, W. R. Cole. Coal Age, vol. 26, no. 11, Sept. 1924, pp. 355-358, 5 figs. Revolving dump drops coal to a boom that feeds a steel-tube or storage bin. Each carload passes over boom alone and consequently every man's product gets individual inspection.

Economical. Reducing Costs in the Moscow Coal Basin by Change of Working Methods, A. Voskresensky. Russian Min. Jl., vol. 100, no. 3, Mar. 1924, pp. 291-295. (In Russian.)

Educational Requirements. Mining Education in the South Wales Coal Field. Colliery Guardian, vol. 128, nos. 3314 and 3315, July 4 and 11, 1924, pp. 27-28 and 91-92. Board of Education (Welsh Dept.) has issued report on provision of instruction for persons employed in coal mining industry in coal field of South Wales. Discusses aspects of mining education and existing provisions in coal field and suggests centralized organization.

European Practice. What American Coal Mining May Learn from Europe's Mines, John T. Ryan. Coal Age, vol. 25, no. 2, Jan. 10, 1924, pp. 41-45, 6 figs. More labor and capital is spent to save coal than in America because of limited coal resources; great care expended to protect life; wage provisions in Great Britain.

France and Belgium. Coal Mining in the North of France & Belgium, M. Hay and W. H. Wilcockson. Colliery Guardian, vol. 123, nos. 3321, 3323, 3325, and 3326, Aug. 22, Sept. 5, 19 and 26, 1924, pp. 481-482, 609-610, 741-743 and 803-804, 28 figs. Gives geology of region, geological structure, Campine coal field, character of coals, mining conditions in coal field, Pas-de-Calais, Nord coal field, Mons, Centre, Charleroi, Namur and Liege Basins, Campine, etc. Methods of working; haulage; screens and washeries; power production; social conditions, wages, housing, etc.

Germany. Coal and Pitchcoal Mining in Bavaria (Der Stein- und Pechkohlenbergnau in Bayern), Bergbau, vol. 37, nos. 23 and 24, Oct. 23 and 30, 1924, pp. 617-619 and 635-637. Geological formation, and deposits and their mining conditions.

Handling Coal. See COAL HANDLING.

Hungary. The Collieries of the First Danube Steam Navigation Company (D. D. S. G.), J. Herczegh. Iron & Coal Trades Rev., vol. 109, no. 2956, Oct. 24, 1924, pp. 666-668, 8 figs. See also Colliery Guardian, vol. 128, no. 3331, Oct. 31, 1924, pp. 1129-1131, 6 figs. Describes mining practice of Hungarian Liassic coal fields; coal washing and screening; power station; conditions of working coal; shafts and winding gear; surface machinery. (Abstract.) Paper read before Midland Inst. Min. Engrs.

Hydraulic Stowage. Hydraulic Stowage at a Lorraine Colliery. Colliery Guardian, vol. 128, no. 3325, Sept. 19, 1924, p. 748, 1 fig. Method of hydraulic stowage adopted by Merlebach Colliery, from which 4230 tons of coal are raised per day in two shafts. Abstracted from Revue de l'Industrie Minérale.

Hydraulic Stowage at the Dalzell and Broomside Colliery, Motherwell, R. W. Dron. Instn. Min. Engrs.—Trans. ,vol. 64, part 5, Feb. 1924, pp. 271-276 and (discussion) (276-283. Experience in application of the process where it has been in operation at a Scottish colliery since 1910.

Hydraulic Stowage at the Mines at Villebœuf (France) (Le remblayage hydraulique aux mines de Villebœuf), E. Jaboulay. Revue de l'Industrie Minérale, no. 81, May 1, 1924, pp. 219-236, 6 figs. Notes on material employed; nature of fill, its preparation and transport in dry state; arrangement of spaces to be filled and method of stowing.

Old Workings at Cassidy, B. C., Flushed with Fine Rock, Jas. B. Touhey. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 654-655, 2 figs. Hope to prevent spontaneous combustion; borehole sunk through quicksand and solid rock; stowing material carried underground by flume.

Some Uses for Hydraulic Stowing, R. Kirkby. Instn. Min. Engrs.—Trans., vol. 67, part 4, July 1924, pp. 336-345, 7 figs. Discusses reasons for using water stowing: (1) possibility of safely working coal seams subject to spontaneous combustion, (2) effectiveness of system in sealing off fires, and (3) practicability of preserving good main roads where coal is completely extracted.

Some Uses for Hydraulic Stowing, R. Kirkby. Min. Inst. Scotland—Trans., vol. 45, part 2, June 1924, pp. 36-45, 8 figs. partly on supp. plate. Application of system at Lochhead coal mine by Wemyss Coal Co.

Inclined-Seam Working. A Method of Working a Highly Inclined Thick Coal-Seam, J. A. H. Church. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 539-544. Author describes only method in his knowledge by which stowings at infinitesimal cost per ton can be introduced into mine.

Comparisons and Estimated Costs of Working a Thick Pitching Coal Seam by Advancing and Downward Method, and by the Proposed Retreating and Upward Method, R. H. Watson. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 545-562 and (discussion) 562-564, 2 figs. Study of cost of method of working thick inclined coal seams from dip upward, as described in paper by J. A. H. Church.

India. Some Problems of Indian Coal-Mining, D. Penman. Min. Inst. Scotland—Trans., vol. 45, part 2, June 1924, pp. 46-52. See also Instn. Min. Engrs.—Trans., vol. 67, part 4, July 1924, pp. 346-352. Notes on extraction of pillars; timbering; air blasts; spontaneous combustion; hydraulic stowing; coal-dust danger; coal cutting; and underground transport.

Industry, Economics of. Economics of the Coal-Mining Industry, E. Williams. Instn. Min. Engrs. —Trans., vol. 68, part 1, Oct. 1924, pp. 72-81 and (discussion) 81-89. Discusses price of coal, wages in coal-mining industry, costs of production other than wages, capital in coal industry and its remuneration, and output factor.

Japan. Coal Mining in Japan, D. C. Bliss, Jr. Coal Trade Bul., vol. 52, no. 2, Dec. 16, 1924, pp. 82-83. Total production for 1923 for all of Japan, exclusive of her dependencies was 28,948,820 metric tons, all bituminous. Notes

on the different mines, mining methods, and general machinery requirements.

Laying Out Workings. Machine Mining. Sci. & Art of Min., vol. 34, no. 12, Jan. 5, 1924, pp. 182-183, 3 figs. Laying out workings; semi-longwall method of working; wide headings; coal pillars; advantages of system.

Loading Machines. See COAL HANDLING, Loading Machines.

Longwall System. Glen Alden Operates Three Longwall Faces with Conveyors in a Thirty-Inch Coal Seam, F. H. Kneeland. Coal Age, vol. 26, no. 3, July 17, 1924, pp. 71-74, 6 figs. Description of seams in Glen Alden Coal Co.'s mines and of its mining methods.

H. S. Gay Long Ago Tried Out "Modified Longwall," A. F. Brosky. Coal Age, vol. 26, no. 20, Nov. 13, 1924, pp. 677-680, 5 figs. Efforts in 1905 at full retreating longwall failed because of uncontrollable roof, but rib-slapping in rooms 300 by 80 ft. was safer and raised output to 9.2 tons per day per inside employee.

Undersea Longwall Mining, J. Moffat. Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 140-142, 1 fig. At distance of 2½ mi. undersea and with cover of 1350 ft., Nova Scotia mine was changed from room and pillar to longwall with great success.

With Hand Shoveling 10 Tons per Man and 26 Tons per Loader Already Attained, A. F. Brosky. Ry. Mech. Engr., vol. 98, no. 2, Feb. 1924, pp. 197-203; 9 figs. Results of introducing modified longwall system of mining, loading coal mechanically and using conveyors to afford means of continuously transporting coal from working face to tipple; advantage of described system over room-and-pillar and over ordinary longwall mining.

Machine Loading. Machine Loads 377 Tons Into 2-Ton Cars in 8 Hours from Room Workings, A. F. Brosky. Coal Age, vol. 26, no. 25, Dec. 18, 1924, pp. 857-863, 9 figs. In mine at Braznell, W. Va., loading machines are applied successfully to room-and-pillar mining; average production per month is 289 tons; pillar coal is loaded mechanically.

They Are Solving Coal-Loader Problems at Hanna. Coal Age, vol. 26, no. 18, Oct. 30, 1924, pp. 618-620, 3 figs. Wyoming thick-seam conditions seem ideal for loading machines yet heavy time losses cannot be avoided; small units save money even at 104 tons a day; single track with switch proves best for rooms.

Machine Mining. Machine Mining. Sci. & Art of Min., vol. 34, nos. 15 and 16, Feb. 16 and Mar. 1, 1924, pp. 228-229 and 246-247, 4 figs. Feb. 16: Laying out workings for machine mining. Mar. 1: Laying out working faces; advantages and disadvantages of conveyors.

Notes on Machine Mining, L. C. Maitland. Iron & Coal Trades Rev., vol. 109, no. 2965, Dec. 26, 1924, pp. 1038-1040 and (discussion) 1040-1041. Conditions which suggest successful use of coal-cutting machines; position of cut, depth of cut, and type of machine; preparation of machine face; organization and supervision by colliery officials.

Problems of Mechanical Coal-Mining, Sam Mavor. Instn. Min. Engrs.—Trans., vol. 67, part 5, Aug. 1924, pp. 456-480. See also Colliery Guardian, vol. 127, nos. 3311 and 3312, June 13 and 20, 1924, pp. 1510-1512 and 1591-1592 and Iron & Coal Trades Rev., vol. 108, no. 2936, June 6, 1924, pp. 967-970. Notes on economics; intensive machine mining; standardization; mechanical coal cutting; underground conveying; lighting of machine faces; organization and supervision; transport; limitations and possibilities.

Suggestions for Concentrated Machine Mining, N. D. Levin. Coal Age, vol. 26, no. 4, July 24, 1924, pp. 109-112, 9 figs. Suggests certain principles that should be kept in mind in laying out a mine or a part of a mine for mechanical loading.

Machinery, Handling of. What Everyone in the Industry Should know About Handling of Mining Machinery, T. F. McCarthy. Coal Age, vol. 25, no. 9, Feb. 28, 1924, pp. 307-310, 3 figs. Points out that many equipment failures are due to lack of understanding of machines; devices should be designed to meet mining conditions.

Management in. See INDUSTRIAL MANAGEMENT, Coal Mines.

Methods and Equipment. Better Methods and Improved Equipment Increase Production at Beech Bottom Mine (W. Va.), A. F. Brosky. Coal Age, vol. 25, no. 15, Apr. 10, 1924, pp. 521-527, 8 figs. By locating power plant at mine, cost of power is greatly reduced; means adopted to reduce loss of coal in mining and to save unnecessary handling of slate.

Caving-in by Tiers and Diagonal Mining of Thick Seam With a Precipitate Dip (Etagenbruchbau und Diagonalbau in steilgelagerten, mächtigen Flözen), K. Sieben. Glückauf, vol. 60, no. 47, Nov. 22, 1924, pp. 1083-1086, 4 figs. Discusses two new methods of mining seams of great thickness at Miechowitz mine in Prussia.

Mining Methods at Ellsworth, A. M. Michell. Coal Industry, vol. 7, no. 5, May 1924, pp. 182-186, 6 figs. Cost-reducing methods at Bethlehem Mines Corpn., mines in Pennsylvania; describes mining system; haulage and ventilation practice.

With Slabbing System and One Machine Loader Gay Handles 250 Tons of Coal in 8 Hours, A. F. Brosky. Coal Age, vol. 26, no. 22, Nov. 27, 1924, pp. 745-750, 6 figs. Methods employed at mine of Gay Coal & Coke Co., Logan County, W. Va.; mechanical loader increases output per face employee 40 per cent; parting from 8 to 20 in. thick removed by arcwall machine.

See also Machine Mining; V-System.

Mine Tubs, Cleaning of. Mechanical Cleaning of Mine Tubs. Indus. Mgmt. (Lond.), vol. 11, no. 13 (new series), July 1924, pp. 361-362, 4 figs. Describes mechanical cleaning system for mining tubs successfully installed in Germany; cleaning devices consist of system of rotating brushes which enter tub while retained in horizontal position in one or other of rotary tub tipplers during cleaning process.

New Zealand. See Australasia.

Nova Scotia. Coal Mining in Nova Scotia in 1923, F. W. Gray. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 31-33. Production; output of various collieries; new collieries; outlook for 1924.

Pneumatic Tools. Miners' Hammers (Abbauhämmer), H. Grahn. Glückauf, vol. 60, no. 32, Aug. 9, 1924, pp. 683-689, 26 figs. Discusses development of pneumatic cutters and their field of application in Ruhr; various kinds of control, comparison as to efficiency and life.

Power Consumption, Reduction of. How to Save Power and Thus Reduce Maintenance and Operating Costs of Mine Machinery, W. H. Russell. Coal Age, vol. 26, no. 15, Oct. 9, 1924, pp. 499-500, 2 figs. It is shown that reduction in power required by machines will make savings by decreasing wear and strain on every part of machine, but saving of power is in itself well worth while.

Power Data. Power Data for Illinois Coal-Mining, A. J. Hoskin. Technograph, vol. 36, no. 11, Jan. 1924, pp. 74-75, 102 and 104, 2 figs. Explains why Illinois power companies can buy

coal, develop power from it, and sell power back to coal mining companies cheaper than they can develop it themselves.

Railway Transportation. The Railway's Part in Coal Mining, D. W. McDonald. Can. Inst. Min. & Metallurgy—Bul., no. 152, Dec. 1924, pp. 871-874. Outline of problem and general policy of taking care of normal traffic, and suggestion of ways in which, by means of coöperation, still greater efficiency could be obtained.

Regulations. U. S. Rules Make Mines in Public Lands Safer, H. I. Smith. Coal Age, vol. 26, no. 1, July 3, 1924, pp. 8-11, 7 figs. Deals with features of regulations for coal mining on leased public lands in United States which have to do with safety.

Rock Disposal, Aerial Tramway for. Aerial Tramway Solves Rock Disposal Problem, A. F. Brosky. Coal Age, vol. 26, no. 11, Sept. 11, 1924, pp. 363-366, 7 figs. Describes aerial tramway installed at Beech Bottom mine, near Wheeling, W. Va., for disposal of mine refuse. Tramway 3200 ft. long; dumping point 200 ft. higher than coal bed; little power required for operation; only 4 men needed to dispose of 400 tons of slate per shift.

Roof Supports. Support of Roof at the Coal Face. Sci. & Art of Min., vol. 34, no. 21, May 10, 1924, pp. 326-327, 4 figs. Choice of supports; timber props; undersetting props.

Room-and-Pillar Method. Modernize!—Some Revolutionary Suggestions with Practical Possibilities in Actual Practice, W. M. Dake. Coal Age, vol. 25, no. 4, Jan. 24, 1924, pp. 131-135, 5 figs. Describes system of mining by room-and-pillar method with conveyor belts from coal face to tipple, giving cost data; tracks only for delivery of supplies on storage-battery trucks or locomotives.

Room-Slabbing, Output Control in. How Output of Room-Slabbing Mines May Be Controlled, C. Gottschalk. Coal Age, vol. 26, no. 8, Aug. 21, 1924, pp. 251-252, 2 figs. While slabbing pillars, record tonnage is obtained. When driving rooms, output is low. Methods that keep output steady.

Shot Firing. Britain Drastically Revises Its Shotfiring Rules. Coal Age, vol. 26, no. 19, Nov. 6, 1924, p. 646. Shotfirers must be certified and must not be paid tonnage rate; coal dust must be treated before shooting.

Minimizing Stray Currents, W. Vogel. Explosives Engr., vol. 2, no. 11, Nov. 1924, pp. 383-386 and 395, 7 figs. European methods and precautions for eliminating dangers from this cause in electrical shot-firing. Translated from Elektrische Betrieb.

Safety in Shot Firing in Flammable Medium (La sécurité du tir en milieu inflammable), M. E. Audibert. Revue de l'Industrie Minérale, no. 87, Aug. 1, 1924, pp. 373-390, 6 figs. Discusses methods used at Montlucon for determining safety of explosives for firing in firedamp mines, velocity of decomposition of explosives, detonation of nitroglycerine, etc.

Small Haulage Engines. Working Coal to the Deep Without Horses, R. N. Lundie. S. Wales Inst. Engrs.—Proc., vol. 40, no. 1, Mar. 21, 1924, pp. 63-69, 1 fig. How coal can be won by economical use of small haulage engines, mostly of single-drum type, no horses at all being necessary. Only conditions required are that coal is worked to deep, inclination is not less than 3 in. per yd., or more than about 12 in. per yd., and that thickness of seam to be won is 3 ft. or over.

South Africa. Coal Mining in South Africa. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 13-14. Brief review of present position of industry.

Stripping. Coal-Strip Enterprises Grow in Western Kentucky, A. W. Williams. Coal Age, vol. 25, no. 4, Jan. 24, 1924, pp. 127-129, 3 figs. Sunlight Min. Co., of Madisonville, lead field with first plant opened about three years ago; 12 pits now running and three more about to open; operators face many problems.

Coal Stripping in Kansas, T. Marvin. Explosives Engr., vol. 2, no. 7, July 1924, pp. 224-227, 10 figs. Gives blasting methods employed in Pittsburg field to assist world's largest type of steam shovels.

Early Coal Stripping Full of Heartbreak, G. Holmes. Coal Age, vol. 25, nos. 22 and 23, May 29 and June 5, 1924, pp. 797-800 and 835-839, 10 figs. Story of coal stripping from its beginnings at Danville, Ill., in 1866.

Getting More Work from a Stripping Shovel, A. F. Brosky. Coal Age, vol. 26, no. 5, July 31, 1924, pp. 141-144, 5 figs. Long-reach stripping shovels are slow in operation; by providing separate machine to waste spoil, capacity of small shovel may be greatly increased.

Modern Anthracite Stripping, T. Marvin. Explosives Engr., vol. 2, no. 3, Mar. 1924, pp. 81-84, 10 figs. Drilling, blasting, loading, and hauling methods at Hazle Brook strippings, of Central Pennsylvania Stripping, Quarry & Construction Co., near Hazleton, Pa.

Strip Mines Full of Pitfalls for the Unwary, G. Holmes. Coal Age, vol. 26, no. 7, Aug. 14, 1924, pp. 211-216, 12 figs. Details of stripping practice, stripping by train and scraper, 300-ton electric shovel, etc.; circular, rectangular, etc., methods.

Stripping a Twice-Worked Anthracite Basin, F. H. Kneeland. Coal Age, vol. 26, no. 23, Dec. 4, 1924, pp. 789-792, 4 figs. Stripping practice at Cranberry Creek Coal Co.'s coal deposit near Hazleton, Pa.; modern machinery makes total recovery possible; giant electric shovel used; Ward-Leonard control employed; automatic dump cars for disposal of spoil.

Surface Plants. Colliery Surface Plants, J. W. Wardell. Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 66-70, 4 figs. Survey of requirements involved and methods adopted to insure their fulfilment.

Thin Seams. Best Method of Opening and Working a Thin Seam 22 Inches Thick to Produce 4,500 Tons per week, R. C. Morgan. Iron & Coal Trades Rev., vol. 108, no. 2914, Jan. 4, 1924, pp. 18-20, 8 figs. Development of face, machine-cut faces, dealing with a wet seam, economical working of developed seam, turning stalls off headings, and arrangement of shifts and general organization.

Top Cutting. Utah Company Uses Top Cutting Successfully, Thos. A. Stroup. Coal Age, vol. 25, no. 17, Apr. 24, 1924, pp. 599-602, 6 figs. See also Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 151-154, 4 figs. Cutter bar bent to avoid loss of height; top cutter saves its cost in timber, and coal lost in roof is compensated in coal saved in drawing pillars; suited only to thick coal.

Tunneling. Tunnel Problems Simplified. Sci. & Art of Min., vol. 34, no. 19, Mar. 29, 1924, pp. 274-275, 2 figs. **Examples illustrating** applica of simplest of ideas to solution of such problems as arise in connection with practice of tunneling in coal mines and showing that application of principles rather than an attempt to use formulas is essential to correct solution of such problems.

United States. Coal Mining in the United States, E. K. Scott. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 32-33 and 50, 1 fig. Some observations made by author on mining methods, equipment, personnel and costs, regulations, etc.

Vancouver Island. The Problems of the Vancouver Island Coal Industry, C. Graham. Can. Inst. Min. & Metallurgy—Bul., no. 147, July 1924, pp. 467-488, 8 figs. Discusses geological formation, operating conditions, state of mines, preparation and marketing.

V-Panel System. V-Panel Mining Progressing in Southern Colorado, E. W. Davidson. Coal Age, vol. 26, no. 21, Nov. 20, 1924, pp. 711-714, 7 figs. West Virginia system minus conveyors is transplanted to Boncarbo mine of Am. Smelting & Refining Co.; tracks are kept parallel to faces in each V; roof gives trouble but cost of coal is cut.

"V" System. Coal Mining by the V System, G. B. Southward. Am. Inst. Min. & Met. Engrs.—Trans., no. 1300-C, Feb. 1924, 9 pp., 6 figs. See also Explosives Engr., vol. 2, no. 10, Oct. 1924, pp. 357-361, 8 figs. Describes mining system used at Norton mine of W. Va. Coal & Coke Co., a highly concentrated system consisting of a series of short faces arranged to get complete recovery of coal with maximum protection for men and equipment.

Notes on Mining by the "V" System in West Virginia, J. C. Nicholson. Can. Inst. Min. & Metallurgy—Bul., no. 152, Dec. 1924, pp. 866-870, 1 fig. Advantages of system are enumerated.

Vertical Cutting. Vertical Shearing Saves Powder but Makes Slack, E. W. Davidson. Coal Age, vol. 26, no. 18, Oct. 30, 1924, pp. 607-609, 4 figs. After exhaustive tests, Utah Fuel Co. decides not to adopt vertical cutting in rooms and entries; center shear cut is tried with both top and bottom cuts in narrow work and rooms.

Wages in. See WAGES, Rate Setting in Coal Mining.

COAL STORAGE

Advisability of. Is Coal Storage Worth While? Power, vol. 59, no. 2, Jan. 8, 1924, pp. 42-44, 7 figs. Points out that regular systematic, large-scale storage of coal, by consumers during seasons of low consumption is public's largest opportunity and responsibility in solving coal problem.

Bins. Concrete Coal Bunkers, F. Dawson. Eng. & Boiler House Rev., vol. 39, no. 9, Apr. 1924, pp. 313-314, 2 figs. Leading features of reinforced-concrete construction. Notes on recent contract placed by Lond. County Council for new coal bunkers at Greenwich.

The Coal Bunker of the Höchst Color Works—Walls of Lupescu Hollow Brick, German Patent 326,196 (Kohlensilo Ch 36 der Höchster Farbwerke.—Wände aus Formsteinen System Lupescu D.R.P. 326,196), H. Baumann. Beton u. Eisen, vol. 23, no. 12, June 20, 1924, pp. 145-148, 13 figs. Details of design and construction of new plant for coal storage and distribution.

Bunkers. See Bins.

Economic Phases. Economic Phases of Coal Storage, F. G. Tryon and W. F. McKenney. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 73-76 and 108, 2 figs. Also Universal Engr., vol. 39, no. 4, Apr. 1924, pp. 19-25, 2 figs. Extent to which practice of storage has already been adopted; inducements to store offered by periodic fluctuations in price and supply of coal. (Abridged.)

Hollow-Tile Silo. Storing Coal in Hollow-Tile Silo. Iron Age, vol. 114, no. 26, Dec. 25, 1924, pp. 1675-1676, 2 figs. Handling equipment with self-weighing and recording features; live and reserve storage in one unit.

Losses in Storage Coal. The Storage of Bituminous Coal, W. Seymour. Eng. Jl., vol. 7, no. 4, Apr. 1924, pp. 183-185, 4 figs. Losses which may occur in storage coal and proposed remedies.

Precautionary Measures. What to Avoid When Storing Soft Coal, A. J. Hoskin. Coal Age, vol. 25, no. 23, June 5, 1924, pp. 840-842, 2 figs. Conclusions from results of investigation carried out at University of Illinois.

Scientific. Scientific Coal Storage. Blast Furnace & Steel Plant, vol. 12, no. 9, Sept. 1924, pp. 418-420, 1 fig. Summary of report of storage of coal committee of Am. Eng. Council.

Systems. Coal Storage (Zweckmässige Kohlenlagerung), Rogenhofer. Archiv für Wärmewirtschaft, vol. 5, no. 10, Oct. 1924, pp. 193-194. Reviews recent literature on subject.

Coal-Storage Systems, H. E. Birch and H. V. Coes. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 189-196 and (discussion) 196-198 and 233, 8 figs. Deals with advantages and limitations of various devices and systems in general way; particular attention is purposely given to limitations of devices, as practically all that is written on subject states only what a device was designed to do and how well it accomplishes its object.

Coal-Storage Systems for Large Plants. Power, vol. 59, no. 5, Jan. 29, 1924, pp. 172-173, 4 figs. Notes on bridge tram for coal handling; cableway system; use of scraper to reclaim coal and skip hoist in connection with scraper.

Some Methods of Storing Coal. Power, vol. 59, no. 3, Jan. 15, 1923, pp. 96-98, 6 figs. Discusses several low-priced systems of coal handling and storing.

COAL TAR

Low-Temperature. A Comparative Study of Some Coal Tars Produced by Low-Temperature Carbonisation, K. B. Edwards. Chem. & Industry, vol. 43, nos. 19 and 20, May 9 and 16, 1924, pp. 143T-148T and 149T-156T, 8 figs. Record of investigation commenced by author in 1920, and carried out on four typical low-temperature tars. Bibliography.

Products. Coal Tar Products. Chem. Age (Long.), vol. 11, no. 285, Nov. 29, 1924, pp. 544-547. Recent developments in their application.

COAL TIPPLES

Economical. Coal Prepared with Minimum Breakage, F. G. Koper. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 19-20, 3 figs. Coal screening and loading plant in smokeless-coal field designed to largely eliminate degradation; describes well-designed and economical tipple.

Variable-Speed. A New Distributing Tippler. Iron & Coal Trades Rev., vol. 108, no. 2925, Mar. 21, 1924, p. 471, 5 figs. Particulars of variable-speed tippler installed at Church Pit of Backworth Collieries, Ltd., Northumberland, Eng.; insures satisfactory distribution of coal without in any way restricting tippler output.

COAL WASHING

Alabama Practice. Coal Washing Practice in Alabama, H. S. Geismer. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1363-C, Sept. 1924, 17 pp., 6 figs. Also Coal Age, vol. 26, no. 15, Oct. 9, 1924, pp. 501-504, 3 figs. For producing coking coal, three-compartment jigs are favored; mines providing steam and commercial coal use single-compartment jigs exclusively. Chemists are as necessary to washing plants as recording gages are to power plants. Experiments in Alabama indicate that sludge released by coal washing plants can be deposited in streams and on agricultural lands without disastrous results.

Autolaveur System. The Autolaveur Coal-Washing System, D. Adam. Colliery Engr., vol.

1, no. 6, Aug. 1924, pp. 267-269, 7 figs. Brief account of new coal-washing development which has recently been used in Belgium.

European Methods. Europe Is Developing Some New Methods for Washing Coal, C. H. S. Tupholme. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 649-650, 2 figs. Most promising ones employ pulsating jig with double-rock discharge, an oil froth in vacuum or an air suction dryer.

Flotation Processes. Application of Sand-flotation Process to the Preparation of Bituminous Coal, T. M. Chance. Am. Inst. Min. & Met. Engrs.—Trans., no. 1352-C, June 1924, 10 pp., 4 figs. Types of plant installed; operating results; maintenance; bituminous coal washing; bituminous washery estimates.

Coal Washing by the Flotation Process (Le lavage des charbons par flottage), Ch. Berthelot. Génie Civil, vol. 84, no. 22, May 31, 1924, pp. 521-526, 9 figs. Treatment of coal dust and sludge containing high percentage of ash.

Elmore-Diel-Koppers Plant for Coal Flotation. Iron & Coal Trades Rev., vol. 109, no. 2952, Sept. 26, 1924, p. 519, 1 fig. Describes Koppers type of apparatus for dressing coal by flotation on Elmore-Diel system. Translated from Technische Blätter.

Much High-Grade Material in Inferior Coals Which Sand Flotation Can Release, H. M. Chance. Coal Age, vol. 25, no. 18, May 1, 1924, pp. 633-635, 1 fig.. Features in connection with application of sand-flotation process.

The Application of Froth Flotation to Coal Washing, L. Dessagne. Fuel, vol. 3, no. 9, Sept. 1924, pp. 320-327, 6 figs. Discusses theory and use of froth flotation washer, its economic value and conditions for its use; describes froth flotation washer.

The Chance Sand Flotation Process as Applied to the Washing of Coal, H. M. Chance. Fuel, vol. 3, no. 8, Aug. 1924, pp. 269-275, 2 figs. Gives working instructions based upon three years' commercial operation of process and upon tests with working models.

The Cleaning of Coal by the Conklin Flotation Process, F. A. Downes. Fuel, vol. 3, no. 11, Nov. 1924, pp. 400-403, 2 figs. Continuous separation of coal from its impurities is accomplished by flotation in bath of pulp having specific gravity between that of coal and rock.

The Flotation of Coal According to the Gröndal-Franz Process (Die Schwimmaufbereitung von Kohle nach dem Verfahren von Gröndal und Franz auf der Zeche Mont Cenis), R. Wüster. Glückauf, vol. 60, no. 2, Jan. 12, 1924, pp. 19-23, 7 figs. Describes first plants erected in Germany at Mont Cenis for flotation of washery coals and gives experimental and practical results so far achieved.

The Flotation of Coal by the Gröndal-Franz Process, F. Wüster. Eng. Progress, vol. 5, no. 8, Aug. 1924, pp. 147-150, 7 figs. After short discourse upon Gröndal flotation process adapted by Dr. Franz to special requirements of flotation of coal, first coal-flotation plants in Germany, built by Erz- und Kohle Flotation G.m.b.H. in Bochum at Mont Cenis Colliery for treatment of coal sludge are described and experimental and practical results hitherto obtained reported upon.

The Gröndal-Franz (Ekof) Flotation Process (Das Schwimmverfahren von Gröndal-Franz der Ekof), Treptow. Metall u. Erz, vol. 21, no. 1, 1st Jan. issue, 1924, pp. 1-6, 2 figs. Describes application of process to midlings from Mittelberg copper pyrites ore.

The Sand Flotation Method of Chance Coal Co. Coal Trade Jl., vol. 55, no. 28, July 9, 1924, pp. 599-600. Describes flotation method for coal separation, invented by T. M. Chance, a simple and positive method that has proved a great success.

The Washing of Fine Coal by the Froth-Flotation and Concentrating-Table Processes at Oughterside Colliery, Cumberland. Instn. Min. Engrs.—Trans., vol. 67, part 4, July 1924, pp. 374-389, 8 figs. Discusses principle of froth flotation, gives flow sheets, cost of plant and running costs, etc.

See also Methods.

Float-and-Sink Test. The Float-and-Sink Test for Fine Coal, B. M. Bird and H. E. Messmore. U. S. Bur. Mines—Reports of Investigations, no. 2586, Mar. 1924, 4 pp. Describes test which is a laboratory means of making an accurate separation according to specific gravity, of coal, bone, and shale, and is applicable to any sample of which it is desired to know proportion of each of these materials. Can be applied satisfactorily in determining possibilities of removal of high-ash impurities from coal by washing, in determining efficiency of crushing as a means of liberating these impurities from coal, and as a check on efficiency of washing operations.

Methods. A Study of Coal Washing (Contribution à l'étude des lavoirs à charbon), C. Wolf. Revue de l'Industrie Minérale, no. 82, May 15, 1924, pp. 245-269, 15 figs. Discusses relative methods of tank washing and Rheolaveur process; how both systems operate; regulation of washing apparatus; mechanical power required, maintenance and control; causes of accidental interruptions. Appended note on calculation of stability of Rheolaveur flow washers.

Coal Washing at Oughterside, J. G. Scoular and B. Dunglinson. Gas Wld., vol. 80, no. 2076, May 3, 1924, pp. 13-17 (includes discussion). Impurities in coal; economic crushing size for cleaning purposes; principle of froth flotation; operation of flotation process; installation at Oughterside, concentrating table and vibratory screen drying, operating results, running costs, control of process, etc. Summary of paper read at joint meeting of Newcastle Sec. Soc. Chem. Industry and Northern Sec. Coke Oven Mgfs. Assn.

See also Autolaveur System; Flotation Processes; Rheolaveur Process.

Plants. Modern Coal Washing (Neuzeitliche Kohlenwäschen), Maercks and Otten. Archiv für Wärmewirtschaft, vol. 5, no. 10, Oct. 1924, pp. 195-199, 6 figs. Discusses operation of a modern plant, flotation of coal sludge, drying, increased value of fuel by washing, etc.

New Classifying and Washing Plant and Agglomerate Works of the Carabinier Coal Mines at Pont-de-Loup (Les nouvelles installations de triage-lavoir et fabrique d'agglomérés des Charbonnages du Carabinier, à Pont-de-Loup), G. Paques. Annales des Mines de Belgique, vol. 25, no. 2, 1924, pp. 329-346, 16 figs., partly on supp. plates. Details of location and layout, concrete construction work, Franki piles, sorting and washing equipment, etc

Wet Washing of Coal at Corbin, British Columbia, E. L. Warburton. Can. Inst. Min. & Metallurgy—Bul., no. 152, Dec. 1924, pp. 933-941, 4 figs. Considers phases and conditions surrounding problem of cleaning coal from Corbin mines; wet washing plant was designed for output of 200 tons of clean coal per shift of 8 hours; whole plant, working one shift, is capable of taking care of output from mines of 1000 tons per day.

Rheolaveur Process. How Washer at British Colliery Readily Treats Mixed Coals of Widely Varying Character, C. H. S. Tupholme. Coal Age, vol. 26, no. 13, Mar. 27, 1924, pp. 455-458, 7 figs. Describes coal washing method used at Butterley

Co.'s Ormonde Colliery; coal up to 3-in. cube is separated into four sizes and each size separately washed; adjustment to suit any kind of coal can be made readily.

Monograph by the Rheolaveur Coal Washing Department at Rochebelle (Monographie de l'atelier de lavage par rhéolaveurs de Rochebelle), M. Charvet. Revue de l'industrie Minérale, no. 83, June 1, 1924, pp. 289-301, 3 figs. Design, construction and operation of fireproof Rheolaveur coal washing plant of Rochebelle mines.

Rheolaveur Coal-Washing Plant in Germany, E. Dupierry. Iron & Coal Trades Rev., vol. 109, no. 2961, Nov. 28, 1924, pp. 866-867, 3 figs. Methods used in Germany, with special reference to Rheolaveur method. Translated from Zeit. des Vereines deutscher Ingenieure.

Tests and Results of Operation with Rheolaveur Coal-Washing Process at the Maria Main Mine (Die mit der Rheo-Kohlenwäsche auf der Grube Maria-Hauptschacht des Eschweiler Bergwerksvereins erzielten Versuchs- und Betriebsergebnisse), A. Wirth. Glückauf, vol. 60, no. 33, Aug. 16, 1924, pp. 711-717, 1 fig. Discusses viewpoints on construction of machines, their operation, power consumption, tabulation of results.

COBALT

Detection of. A New Method of Detecting Cobalt and Nickel Separately or in Presence of Each Other, C. C. Palit. Chem. News, vol. 128, no. 3343, May 9, 1924, pp. 293-294.

Separation from Nickeliferous Ores. Separation of Cobalt from Nickeliferous Ores by the Purpureo-Cobalt Chloride Process, G. T. Morgan and J. D. Main Smith. Chem. & Industry, vol. 43, no. 18, May 2, 1924, pp. 131T-133T. Describes improved process which can be worked at small fraction of cost of existing methods for preparation of purpureo-cobalt chloride, and this could be further lessened by recovery of ammonia, calcium chloride becoming sole waste product.

Smelting. Experiments in Cobalt-Silver-Nickel Smelting, A. C. Harris. Eng. & Min. Jl.—Press, vol. 118, no. 6, Aug. 9, 1924, pp. 214-216. Heat of oxidation of iron and arsenic may displace coke; small test converter proves practicability of process.

COBALT STEEL

Magnet. Cobalt Magnet Steels, E. A. Watson. Engineering, vol. 118, nos. 3060 and 3061, Aug. 22 and 29, 1924, pp. 274-276 and 302-304, 7 figs. Historical review; present production; future prospects; effect of cobalt content on properties of magnet steels; importance of BH max; effect on mechanical properties; heat treatment; effect of hardening conditions; heat treatment of high-carbon high-alloy steels; importance of cooling rate; economical aspect of employment of cobalt steels. Bibliography.

CODES

A. S. M. E. Boiler Code. See BOILERS, A. S. M. E. Codes.

A. S. M. E. Test Codes. See FUELS, Solid, Test Code for.

Lighting. See LIGHTING, Code.

Power Test. See POWER TEST CODES.

COFFEE

Machinery for Preparation. Coffee-Preparing Machinery. Engineering, vol. 118, no. 3068, Oct. 17, 1924, pp. 541-542, 8 figs. Describes exhibits at British Empire Exhibiting of series of machines built for coffee plantations, for pulping, washing, drying, polishing, and grading coffee berries.

COFFERDAMS

Bridge-Pier. See BRIDGE PIERS, Cofferdam Wreckage.

Stress Computation in Single-Wall. A Novel Method of Computing Stresses in a Single-Wall Cofferdam, H. A. Davies. Cornell Civ. Engr., vol. 33, no. 2, Nov. 1924, pp. 31-35, 2 figs. Method for designing structural elements of cofferdam, when sheeting is of uniform cross section, which can be applied to those calculations involved in determining stress distribution in a framed structure resisting lateral pressure, intensity of which increases directly as the depth.

COILS

Costing. The Costing of Winding and Insulating Coils, F. C. Lawrence. Elec. Rev., vol. 95, nos. 2438, 2439, 2440, 2441, 2442, and 2443, Aug. 15, 22, 29, Sept. 5, 12, and 19, 1924, pp. 242-244, 278-280, 318-319, 375-376, 409-410, and 445-446, 3 figs. Indicates some of the methods of costing in connection with manufacture of coils for electrical machinery, transformers and meters, already in operation in many factories, and points out reasons why they are not entirely successful. Describes methods which are deemed to give maximum accuracy obtainable without a vast amount of clerical labor.

Electromagnetic Behavior. Electromagnetic Behavior of Single-Layer Coils (Das elektromagnetische Verhalten der einlagigen Zylinderspule), W. Steidinger. Archiv für Elektrotechnik, vol. 13, no. 4, July 31, 1924, pp. 237-273, 21 figs. Discusses difficulties in calculation, formulates equations, coils of preponderating earth capacity, core functions, theory and experiment, etc.

Insulations. Repeated Thermal Expansions and Contractions, T. S. Taylor. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1047-1050, 6 figs. Their effect on long-armature coil insulations.

Natural Frequency. Natural Oscillations of Coils (Eigenschwingungen von Spulen), F. Reinhardt. Archiv für Elektrotechnik, vol. 13, no. 2, May 31, 1924, pp. 83-108, 16 figs. Investigates various types of coils as to natural frequency, if excited by damped waves, and formulates relations between natural frequency and damping.

Petersen. German System Readopts Petersen Coil. Elec. World, vol. 84, no. 15, Oct. 11, 1924, pp. 786-787, 2 figs. Undergrounded 1000-km., 110-kv. network in Central Germany finds protection necessary after removing coils two years ago.

Pleijel; for Telephone Cables. Development and Practical Applications of the Pleijel Coils (Aufbau und praktische Anwendungen der Pleijelspule), E. Schürer. Elektrotechnische Zeit., vol. 45, no. 11, Mar. 13, 1924, pp. 213-214. Describes chief characteristics of coil arrangement devised by Prof. Pleijel of Stockholm; satisfactory results of acceptance tests on two telephone cables 39 and 27 km. long equipped with Pleijel coils.

Pupin. The Development of Pupin Coils (Die Entwicklung der Pupinspulen), F. Hörning. Elektrotechnische Zeit., vol. 45, no. 10, Mar. 6, 1924, pp. 180-183, 6 figs. Also Siemens-Zeit., vol. 4, no. 8, Aug. 1924, pp. 274-278, 6 figs. Brief review of development and gradual improvement of core material to meet modern requirements; research work has developed pressed-iron-powder core of perfectly circular cross-section, with which faultless transmission of speed can be achieved under any circumstances.

See also CABLES, ELECTRIC, Telephone.

Reactance. The Calculation of Mechanical Stresses Occurring in Reactance Coils (Zur Berechnung der in Reaktanzspulen auftretenden mechanischen Beanspruchungen), J. Hak. Elek-

trotechnik u. Maschinenbau, vol. 42, nos. 2 and 18, Jan. 13 and May 4, 1924, pp. 17-19, 2 figs., and (discussion) 275-277, 1 fig. Formulas are derived for calculating these stresses, showing need of mechanical development of larger reactance coils.

Resistance, Non-Reactive. On a Design for a Bifilar Type of Non-reactive Resistance Coil, H. Nukiyama and Y. Shôji. Tôhoku Imperial Univ.—Technology Reports, vol. 4, no. 1, 1924, pp. 1-20, 13 figs. Describes experiment to determine frequency characteristics of a bifiliar type of non-reactive coil; theory of a bifilar coil as an electric cable; apparent dielectric constant; and method of reducing error in bifilar resistance due to frequency. Bibliography.

Self-Inductance of. On the Calculation of Self Inductance of Coils Wound on Square Forms, Y. Niwa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 425, Dec. 1923, pp. 958-976, 8 figs. Range of application of formula derived by author for calculation of self-inductance of coils with square cross section. A. Esau's criterion on author's formula. Results of experiments and calculations. Formula for self-inductance of solenoid with similar concentrated windings at equal intervals. (In English.)

Self Inductance of Ironless Throttling Coils (Die Induktivität eisenloser Drosselspulen), H. Hemmeter. Archiv für Elektrotechnik, vol. 13, no. 16, Sept. 30, 1924, pp. 460-477, 9 figs. Discusses modification of Stefan formula, by means of which inductance of ironless coils with rectangular winding space is calculated with a degree of accuracy of 0.1 per cent or better.

Telephone. Concerning Telephone Coils, P. K. Higgins. Telephone Engr., vol. 28, no. 4, Apr. 1924, pp. 17-19, 5 figs. Describes various types of telephone coils, including ringer, repeating, and phantom coils; how made, physical properties and applications; resistance, reactance, and impedance.

Variable-Inductance. Coils with Variable Inductance for Audio Frequencies (Ueber Spulen mit veränderlicher Selbstinduktion für Mittelfrequenz), H. Winter-Günther and J. Zenneck. Physikalische Zeit., vol. 25, no. 9, May 1, 1924, pp. 210-212, 5 figs. Describes simple arrangement of two coils, whose position along an iron core can be altered, which gives wide range of values for inductance, combined with low d. c. resistance; curves are given showing variations in inductance and effective resistance as functions of distance apart of coils.

Winding. See ARMATURES, Winding.

COKE

American Output. American Coke Output Analyzed. Iron Age, vol. 114, no. 26, Dec. 25, 1924, pp. 1689-1691, 3 figs. Furnace and non-furnace ovens; coke used in making pig iron; by-product and beehive compared. Abstracted from advance proof sheets of report by F. G. Tryon, U. S. Geol. Survey.

Blast-Furnace. Coke for Blast Furnaces, J. A. Thornton. Gas. Wld., vol. 80, no. 2072, Apr. 5, 1924, pp. 16-17, and (discussion) 17-20. Strength and porosity; ash and moisture; size of coke; beehive versus by-product; combustibility.

Effect of Coking Temperature on Properties of Blast Furnace Coke (Ueber den Einfluss der Verkokungstemperatur auf die Eigenschaften des Hochofenkokses), H. H. Berger. Gas- u. Wasserfach, vol. 67, no. 29, July 19, 1924, pp. 424-425. Discusses production of coke, specific gravity, porosity and compression strength, velocity of combustion; reduction of iron oxides.

Production of High-grade Blast-furnace Coke, H. M. Chance. Am. Inst. Min. & Met. Engrs.—Trans., no. 1351-C, June 1924, 8 pp., 2 figs. Outline of differential separation which makes available vast stores of low-ash coal locked up in coal beds from which it has been impossible to ship anything better than fair grades of steam coal; can be made by any liquid or solution having specific gravity greater than that of coal which is to be floated and less than that of coal that is to be separated by sinking in liquid.

Reactivity of Coke in Relation to Blast-Furnace Operation, G. St. J. Perrott and R. A. Sherman. Engrs.' Soc. West Pa.—Proc., vol. 39, no. 10, Jan. 1924, pp. 351-369 and (discussion) 370-375, 5 figs. Prevailing views as to function of coke in blast furnace and properties possessed by desirable coke; discusses problem in light of recent data secured by writers, both in laboratory and at blast-furnace plants.

By-Product, for Domestic Heating. Advantages for Byproduct Coke for Domestic Heating, A. R. Powell. Coal Age, vol. 25, no. 2, Jan. 10, 1924, pp. 39-40. Eliminates smoke, reduces need to clean furnace and flues, requires less attention than coal and gives even temperature.

Cell Structure. By-Product Coke Cell Structure, O. O. Malleis. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 901-904, 12 figs. Study of coke cell structure of unmixed coal or mixed coals that are very similar.

Combustibility of. The Combustibility of Coke, H. Bähr. Colliery, Guardian, vol. 128, no. 3320, Aug. 15, 1924, pp. 413-414, 2 figs. Details of design of Bähr's apparatus for determining reactive capacity of coke and combustion apparatus and operations. Translated from Stahl u. Eisen.

The Combustibility of Coke: A Critical Survey, Gas World, vol. 81, no. 2098, Oct. 4, 1924, pp. 10-14. Methods of producing coke of high combustibility; factors influencing combustibility; experimental determination of reactivity; important considerations.

Conveying. See Quenching; COKE HANDLING.

Desulphurization. The Desulphurization of Coke by Air, A. R. Powell. Gas. Engr., vol. 40, no. 577, May 1924, pp. 104-106. Details of investigation of desulphurizing effect of air on coke, and experiments to determine optimum temperature for oxidation of ferrous sulphide in coke.

Dry Cooling. Apparatus for Cooling Coke. Gas. Wld., vol. 80, no. 2072, Apr. 5, 1924, pp. 21-23, 4 figs. Describes method and apparatus for cooling coke from coke ovens; incandescent coke from coke ovens is cooled by action of gases in direct contact with coke, gases being first passed through coke to take up heat and afterwards through a steam generator, whereby gases are cooled, to be returned in a cycle to apparatus.

Dry Coke Cooling Plants. Gas. Wld., vol. 81, no. 2085, July 5, 1924, pp. 16-18, 4 figs. Design and construction of Sulzer plant in operation at Keilehaven gasworks, Rotterdam.

Dry-Cooling Coke with Inert Gas, C. H. S. Tupholme. Chem. & Met. Eng., vol. 31, no. 15, Oct. 13, 1924, pp. 574-575, 4 figs. Sulzer process, used in Europe, that overcomes many of objectionable features of other coke-quenching systems.

Dry Cooling of Coke (Ueber trockene Kokskühlung), F. Müller. Wärme- u. Kälte-Technik, vol. 26, no. 20, Oct. 15, 1924, pp. 185-186, 1 fig. Particulars of arrangement for Sulzer method of dry cooling by inert gases, and results of operation at Schlieren gas works, near Zurich.

Dry Cooling of Coke, M.. Johnstone-Taylor. Am. Gas Jl., vol. 121, no. 6, Aug. 9, 1924, p. 728, 2 figs. Some further notes on Sulzer system at Rotterdam.

Sulzer Dry Cooling of Coke in Coking Plants and Gas Works. Gas Engr., vol. 40, no. 578,

June 1924, pp. 123-124, 4 figs. Sulzer patent process for dry cooling consists in circulating inert gas through glowing coke which is enclosed in air-tight receiver; gives layout of plant being installed in French coke works; coke works is designed for output of 930 tons of coke in 24 hr.

The Dry Cooling of Coke. Engineer, vol. 137, no. 3567, May 9, 1924, pp. 514-517, 4 figs. Discusses principle of dry cooling and describes coal-distilling plant at Keilehaven works of Rotterdam Gas Co., consisting of battery of 10 chamber ovens, each of which is provided with 4 chambers having coal capacity of approximately 4½ tons each; experimental results.

Electric Conductivity of Charcoal and. The Electric Conductivity of Charcoal and Coke (Ueber die elektrische Leitfähigkeit von Holzkohle und Koks), R. Durrer. Stahl u. Eisen, vol. 44, no. 17, Apr. 24, 1924, pp. 465-468, 5 figs. Tests to determine relative conductivity of coke and charcoal; conductivity of coke in loose state averages about 1.8 times that of charcoal; in compact state it is only 1.3 times as great.

Foundry. The Examination of Foundry Coke, H. H. Shepherd. Metal Industry (Lond.), vol. 25, nos. 11 and 12, Sept. 12 and 19, 1924, pp. 255-256 and 283-284. Discusses importance of control of coke supplies in cupola melting, giving methods for determination of chief factors concerned, and pointing out particular significance and limits of each factor.

What Constitutes Good Foundry Coke, H. W. Anderson. Foundry, vol. 52, no. 18, Sept. 15, 1924, p. 717. Results of investigation, giving comparative analyses of different cokes, losses sustained by excessive moisture, etc.

Gas. See Sandwich Firing System.

Gas and Colliery, Tests. Report on Comparative Tests of Gas and Mine Coke (Versuche bei Verheizung von Gaskoks und Zechenkoks), Chr. Eberle. Gas- u. Wasserfach, vol. 67, no. 39, Sept. 27, 1924, pp. 585-587, 1 fig. Official report of evaporation tests with two equal low-pressure boilers at Municipal Hospital in Höchst; detailed test data.

Gas- vs. Blast-Furnace. Report on Comparative Tests with Gas- and Blast-Furnace Coke (Bericht über die in der Zeit vom 3. April bis 20. Juni 1924 im Auftrage des Betriebsamtes Fürth durchgeführten vergleichenden Versuche mit Gas- und Hüttenkoks). Gas- u. Wasserfach, vol. 67, no. 46, Nov. 15, 1924, pp. 694-698. Tests for determining relative behavior and efficiency of gas coke produced at Fürth gas works and blast-furnace coke, for use in central heating boilers.

Gasification. The Gasification of Coke in Steam, with Special Reference to Rates of Gasification and the Composition of the Gas, S. Pexton and J. W. Cobb. Gas. Jl., vol. 167, no. 3190, July 2, 1924, pp. 161-169, 7 figs. See also Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 675-678. Investigates composition of gas and amount of undecomposed steam as varying with temperature, velocity of gas stream, and nature of coke used.

Handling. See COKE HANDLING.

Manufacture. See COKE MANUFACTURE.

Metallurgical. Reactivity of Coke (La réactivité du coke), J. P. Arend and J. Wagner. Revue de Métallurgie, vol. 21, no. 10, Oct. 1924, pp. 585-599, 12 figs. Discusses definition of reactivity based on law of equilibrium of reversible reaction of $CO_2 + C = 2CO$), a simple method for measuring it, and rôle of reactivity in blast-furnace operation.

Nitrogen Estimation. See COAL, Nitrogen Estimation.

Ovens. See COKE OVENS.

Peats as Source of. See PEAT, Oil and Coke Recovery.

Preparation. See COAL, Preparation.

Properties. Physical Examination of Coke (Beitrag zur physikalischen Untersuchung von Koks), P. Bardenheuer and G. Thanheiser. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 5, 1924, pp. 13-20, 5 figs. Concludes that determination of permeability to gas is best suited for distinguishing cokes of different qualities, as permeability best discloses available coke surface for reaction gases in blast furnaces.

The Quality of Coke, Determination of Its Properties and the Development of Good Grades (Koksbeschaffenheit, Bestimmung der Eigenschaften und Erzielung guter Sorten), E. Diepschlag. Stahl u. Eisen, vol. 44, no. 18, May 1, 1924, pp. 496-498. Combustibility and strength of coke; coking process; author recommends coking under pressure.

Quenching. Conveying and Quenching of Coke in Gas Works, L. Rodde. Indus. Mgmt. (Lond.), vol. 11, nos. 15 and 16, Sept. and Oct. 1924, pp. 421-422 and 448-450, 9 figs. Discusses quenching, conveying, and storing; factors affecting quality of coke; hand labor vs. mechanical handling; comparison of plants; arrangement of plant; conveying coke breeze; hygienic considerations. Abstract of paper read before German. Soc. Gas & Water Engrs.

"Flood" Patent System of Coke Quenching and Conveying. Indus. Mgmt. (Lond.), vol. 11, no. 6, Mar. 20, 1924, pp. 159-160, 1 fig. Instead of allowing quenching water to drop on top layer of coke batch, it enters quenching tank through a stand pipe of suitable size, situated at convenient position, which is usually near end of coke battery.

Mechanical Coke-Quenching and Loading Devices for Mining and Metallurgical Coking Plants (Maschinelle Kokslösch- und Verladevorrichtungen für Zechen- und Hütten-Kokereien), W. Merkel. Bergbau, vol. 37, no. 17, Aug. 21, 1924, pp. 466-469, 1 fig. Construction and operation of Schöndeling coke-quenching and loading machine. Comparison with others.

Reactivity. The Reactivity of Coke. Gas Jl., vol. 167, no. 3195, Aug. 6, 1924, pp. 513-514, 1 fig. Discusses causes of variations in combustibility, effect of degree of gasification, change in specific gravity and hardness, etc.

The Reactivity (Combustibility) of Coke [Die Reaktionsfähigkeit (Verbrennlichkeit) von Koks], Hans Bahr. Starl u. Eisen, vol. 44, nos. 1 and 2, Jan. 3 and 10, 1924, pp. 1-9 and 39-42, and (discussion) 42-48, 12 figs. Account and results of autor's tests; new method for determination of reactivity; influence of carbon modifications and an artificial powdery-iron addition; conclusions.

See also Blast-Furnace.

Sandwich Firing System. Gas Coke, E. W. L. Nicol. Gas. Jl., vol. 168, no. 3209, Nov. 12, 1924, pp. 432-434, 1 fig. Its relation to industrial and domestic smoke prevention and fuel economy; Sandwich system of fuel blending. (Abstract.) Paper read at Manchester Smoke Abatement Conference.

Surfaces and Structures. Interpretation of Coke Surfaces and Structures, A. Thau. Chem. & Met. Eng., vol. 30, no. 8, Feb. 25, 1925, pp. 306-310, 13 figs. Interprets meaning of variations in coke appearance as affecting coke utility. See also article by same author, entitled How Structure and Surface Affect Combustibility of Coke, in same journal, no. 9, Mar. 3, 1924, pp. 347-350, 6 figs.

Utilization of. Fuel Efficiency with Special Reference to Coke, C. H. S. Tupholme. Combustion, vol. 10, no. 5, May 1924, pp. 349-352.

Low temperature distillation of coal as a solution of fuel problem of future, and discussion of utilization of coke.

Volatile in. See COAL, Volatile-Matter Determination.

COKE HANDLING

Conveying. See COKE, Quenching.

Gas Works. Coke-Handling Plant at Portsmouth Gasworks, S. E. Whitehead. Gas Wld., vol. 80, no. 2070, Mar. 22, 1924, pp. 264-271, 7 figs. Describes locomotive-drawn skips, De Brouwer conveyor "G. N." transporter, quenching bench, storage of coke in concrete hoppers, and telpher handling.

Hoists for. Automatic Coke Hoist, D. Cleave Cross. Gas Wld., vol. 80, no. 2071, Mar. 29, 1924, pp. 292-293, 2 figs. Novel coke hoist erected at Lea Bridge gas works for use with water-gas plant.

COKE MANUFACTURE

Alabama. Byproduct Coking in Alabama, F. W. Miller. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1367-C, Sept. 1924, 7 pp. Brief history of by-product coking in Alabama with short general description of plants and state's production of beehive and by-product coke.

By-Product Coke. Byproduct Coking in Alabama, F. W. Miller. Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 475-477, 2 figs. See also Coal Age, vol. 26, no. 15, Oct. 9, 1924, pp. 506-508, 1 fig. Progress in oven development; labor supply and tonnages. Abstract of A. I. M. E. paper.

By-Product Coking Superior to Beehive Method. Coal Trade Jl., vol. 55, no. 26, June 25, 1924, pp. 553-554. Gives virtues of by-product coking and pronounces beehive method obsolete.

Comparative Survey of Coke-Oven Practice in Various Countries, G. A. Hebden. Iron & Steel of Can., vol. 7, no. 11, Nov. 1924, pp. 223-230, 3 figs. Deals with the matter from practical rather than technical standpoint, and considers only question of coke made in by-product ovens. Discusses separately practice followed in various countries, and compares various methods and conditions.

Making Coke to Combat Canada's Fuel Problem, H. P. Armson. Can. Machy., vol. 31, no. 23, June 5, 1924, pp. 27-30 and 47-48, 4 figs. Also Power House, vol. 17, no. 12, June 20, 1924, pp. 23-27, 4 figs., and Can. Foundryman, vol. 15, no. 6, June 1924, pp. 18-21 and 34, 4 figs. Description of processes by which Hamilton By-Products Coke Ovens Co. produce foundry and domestic coke, tar, ammonium sulphate, city gas, blue water gas, and naphthalene.

Making and Handling By-Product Coke, L. D. McClaren. Black Diamond, vol. 72, no. 26, June 28, 1924, p. 764. Describes three types of processes used in present day coke manufacture; history and meaning of by-product variety; instruction on domestic use.

Sodium Cyanide as a Byproduct of Coke Making, M. E. Mueller. Chem. & Met. Eng., vol. 30, no. 25, June 23, 1924, pp. 978-980, 1 fig. Process that permits recovery of this material or of any other cyanogen compound as by-product.

Coal Blending. Blending of Coal and Its Effect on Coke Made, A. W. Grant, Jr. Gas Age-Rec., vol. 54, no. 17, Oct. 25, 1924, pp. 583-587, 3 figs. Factors that should be considered in selecting a coal mixture. From paper read before Am. Gas Assn.

Coke Ovens. See COKE OVENS.

Formation of Coke Pieces. What Occurs in the Formation of Coke, A. Thau. Chem. & Met. Eng., vol. 30, no. 5, Feb. 4, 1924, pp. 222-227, 13 figs. How propagation of coking steam is affected by varying oven conditions and what this means in coke produced.

India. Coking and By-Products Recovery Practice in India, J. Parker. Gas Wld., vol. 80, no. 2072, Apr. 5, 1924, pp. 11-14, and (discussion) 14-16, 8 figs. See also Colliery Guardian, vol. 127, no. 3302, Apr. 11, 1924, pp. 931-932. Discusses coal handling, silica ovens, recruiting labor, labor troubles, a manager's qualifications in India, heat control, etc.

Non-Coking Coal. Making Coke from Non-Coking Coals by Froth Flotation. Coal Age, vol. 26, no. 25, Dec. 18, 1924, p. 867. Non-coking coals resist coating and flocculation, but sulphuric acid reduces resistance and good coke can then be made.

Problems. Coke Production and Uses (Kokserzeugung und Koksverwendung), K. Bunte. Gas. u. Wasserfach, vol. 67, nos. 48, 49, and 50, Nov. 29, Dec. 6 and 13, 1924, pp. 721-724, 739-744, and 758-760, 19 figs. Properties of gas coke, size, hardness, color, ash and water content, ignition and reaction, composition of coal, process of coking, mixed coal, formation of fissures and cracks, effect of coking velocity and temperature on formation of pores.

COKE-OVEN GAS

By-Product Recovery from. Developments in Recovering Byproducts from Coke-Oven Gases, E. V. Espenhahn. Chem. & Met. Eng., vol. 30, no. 16, Apr. 21, 1924, pp. 629-631. Trends in European practice serve to show American oven operator what future may hold for industry; notes on Burkheiser ammonium-sulphite process; recovering cyanides; production of alcohol; recovery of tar and naphthalene.

Production of Pitch and Tar Oils, Ammonia and Sulphuretted Hydrogen from Coke-Oven Gas by the Feld Process (Die Gewinnung von Pech und Teerölen sowie von Ammoniak und Schwefelwasserstoff aus Kokereigasen nach den Verfahren von Walther Feld), W. Funcke. Glückauf, vol. 60, nos. 38, 39, and 40, Sept. 20, 27, and Oct. 4, 1924, pp. 835-840, 868-876, and 897-905, 8 figs. This process follows reverse order of tar distillation; distillation is replaced by condensation. Polythionate process for recovering ammonia; Feld gas scrubber; experiments with tar separation and gas scrubbing; description and operation of Feld plant, and results obtained.

Utilization. Utilization of Coke-Oven Gas (L'utilisation des gaz de fours à coke), P. Baud. Nature, no. 2636, Oct. 11, 1924, pp. 236-240, 5 figs. Use for street lighting in Ruhr district; manufacture of nitric acid; extraction of hydrogen and ethylene.

COKE OVENS

Becker Type. See Coal Gas from.

By-Product. By-Product Coke Oven Plant, Hamilton. Can. Engr., vol. 46, no. 12, Mar. 18, 1924, pp. 359-365, 5 figs. Description of new plant established in Hamilton, Ont., to manufacture gas, coke, and by-products; coke to be used as substitute for anthracite; will help solve fuel problem.

Coke Plant at Troy to Have New Features. Iron Age, vol. 113, no. 15, Apr. 10, 1924, pp. 1075-1076, 1 fig. Elimination of upper horizontal flue and somewhat different layout of heating flues characterize American oven.

Lights 37 New By-Product Ovens, C. H. Hunt. Iron Trade Rev., vol. 74, nos. 15 and 16, Apr. 10 and 17, 1924, pp. 984-989 and 991, and 1053-1057, 9 figs. New type of narrow oven installed by Weirton Steel Co., W. Va.; high-volatile coals coked exclusively; temperature in heating walls

lowered without sacrificing coking period; plant has hourly capacity for 570,000 cu. ft. of gas and conversion of over 200 gal. of light oil into pure products; operating data.

The Becker By-Product Coke Oven. Iron & Coal Trades Rev., vol. 109, no. 2945, Aug. 8, 1924, pp. 233-234, 9 figs. Details of design and construction of Becker type of Koppers Co. ovens recently introduced into Great Britain.

Weirton's New By-Product Coke Plant, C. H. Hunt. Iron Age, vol. 113, nos. 8 and 9, Feb. 21 and 28, 1924, pp. 573-577 and 653-657, 8 figs. Also Blast Furnace & Steel Plant, vol. 12, nos. 3 and 4, Mar. and Apr. 1924, pp. 166-171 and 182-188, 11 figs. New plant has battery of 37 Koppers Co. Becker-type ovens of 14-in. width, and uses high-volatile coal; results of operation of coking plant and of blast furnace.

Coal Gas from. City Gas from Coke Ovens, R. S. McBride. Chem. & Met. Eng., vol. 31, no. 19, Nov. 10, 1924, pp. 734-736, 4 figs. Describes installation of small-size gas oven of Becker type, built by Koppers Co. in Battle Creek, Mich.

Consett Iron Co., Ltd. New Wilputte Coking Plant at the Fell Coke Works of the Consett Iron Company, Limited. Iron & Coal Trades Rev., vol. 108, no. 2935, May 30, 1924, pp. 909-910, 21 figs. partly on pp. 929-936. Describes coal-handling and coke-handling plants; Wilputte silica battery, comprising 60 ovens in one battery, built between reinforced-concrete end pinions, having a throughput of a little over 6000 tons dry coal per week; ovens machinery; gas main circuit and condensing plant; by-product plant; and benzol plant.

Design and Operation. Coke Ovens (Les fours à coke), A. Baille-Barrelle. Technique Moderne, vol. 16, nos. 10 and 11, May 15 and June 1, 1924, pp. 357-360 and 384-394, 34 figs. Dimensions and characteristics, with special reference to large American ovens; heating of ovens; satisfactory heating conditions; describes most recent types of coke ovens including Lecocq, Simplex, Solvay, Still, Coppee, Davicion, etc., and different ways of handling coke. Bibliography.

Coke Ovens (Les fours à coke), Ch. Berthelot. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 7-9, July-Sept. 1924, pp. 383-432, 11 figs. partly on supp. plate. Discusses modern construction and operation, coke-oven dimensions, choice of quality of gas for use in firing, choice of refractories used, and handling of metallurgical coke. Bibliography.

Recent Progress in the Construction and Operation of Coke Ovens (Les récents progrès de la construction et de l'exploitation des fours à coke), Ch. Berthelot Chimie & Industrie, special no., May 1924, pp. 234-252, 21 figs. Measures employed to increase coking capacity of ovens, such as decreasing size of oven, uniform distribution of heating gas; rational arrangement of heat regenerators, and use of proper refractories.

Koppers. The Salzburg Chamber Oven Plant (Die Salzburger Kammerofenanlage), A. Rosskothen. Gas- u. Wasserfach, vol. 67, no. 47, Nov. 22, 1924, pp. 705-709, 2 figs. Discusses conveying plant, heating, central generators, and comparison of heating with generator gas and mixed gas.

Meguin Vertical. The Vertical Oven (Der stehende Schwelofen). Stahl u. Eisen, vol. 44, no. 42, Oct. 16, 1924, pp. 1286-1290, 2 figs. Notes on low-temperature coking and distillation; stationary and revolving furnaces; design, operation, and advantages of Meguin distilling oven; recovery of by-products.

Narrow-Retort. Coke Ovens with Narrow Retorts (Schmalkammerige Koksöfen). Glückauf, vol. 60, no. 43, Oct. 25, 1924, pp. 978-980, 2 figs. Discusses American, English and German practice and advantages of narrow retorts which are expected to preponderate in future.

Oil Fuel as By-Product. Coke Plants and Oil Fuels (Kokerei und flüssige Brennstoffe), P. Fritzsche. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 23, June 7, 1924, pp. 593-599, 6 figs. Production of liquid fuels by coking of anthracite, by coal-gas production and by low-temperature process; production and preparation of coal tar and benzol hydrocarbons; principles underlying production of low-temperature tar; chemical conversion of coke-oven by-products into liquid fuels.

Piette. Piette Coke Ovens. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 510-512, 12 figs. partly on supp. plate. New coke ovens of Semet-Solvay and Piette Coke Oven Co. of Sheffield, England, with special reference to their battery of 24 coke ovens at Shelton Iron, Steel & Coal Co. of Stoke-on-Trent; each of these can produce 60 tons of coke per week.

Practice. Comparative Survey of Coke-Oven Practice in Various Countries, G. A. Hebden. Colliery Guardian, vol. 127, no. 3310, June 6, 1924, pp. 1459-1460. See also Can. Min. Jl., vol. 45, nos. 41 and 42, Oct. 10 and 17, 1924, pp. 1011-1014 and 1035-1036. Survey of Great Britain, Europe, the Dominions, and America. From paper read before Empire Min. & Metallurgical Congress.

Refractories for. See REFRACTORIES, Coke-Oven.

Waste-Heat and Gas Utilization. The Utilization of Waste-Heat and Surplus Gas from Coke-Ovens, I. C. F. Statham. Instn. Min. Engrs.—Trans., vol. 68, part 3, Dec. 1924, pp. 234-261 and (discussion) 261-270, 16 figs. See also Iron and Coal Trades Rev., vol. 109, nos. 2960 and 2961, Nov. 21 and 28, 1924, pp. 823-825 and (discussion), pp. 863-864, 5 figs.; and Colliery Guardian, vol. 128, no. 3334, Nov. 21, 1924, pp. 1311-1314, 10 figs. Composition of coke-oven gas. Discusses some of the methods employed for utilization of waste heat and surplus gas and summarizes results obtained in practice.

COLD

Production of. The Production of Cold, C. W. Kanolt. Optical Soc. Am.—Jl., vol. 9, no. 4, Oct. 1924, pp. 411-453, 7 figs. Freezing mixtures; cooling with solid CO_2 and by sprayed liquid; principles of mechanical cooling; thermodynamic charts; Carnot cycle; reversed Joule cycle; cycle with throttle expansion; heat interchange; Joule—Thomson effect and theory of Hampson liquefier; precooling and "cascade" system; Linde and Claude systems; construction and operation of Hampson liquefier; liquefaction of hydrogen and other gases; gas compressors, etc.

See also REFRIGERATION.

COLD STORAGE

Eggs. Studies of Eggs in Cold Storage in Relation to Top Layer, M. E. Pennington. Ice & Refrigeration, vol. 67, no. 3, Sept. 1924, pp. 143-148. Results of investigations showing changes in weights of eggs and of packages; conditions in storage warehouse more vital than minor modifications in packages; quality of eggs; type of package used; type of warehouse selected; conduct of experiments.

Furs and Fabrics. Cold Storage for Furs and Fabrics, H. J. Macintire. Heat. & Vent. Mag., vol. 21, no. 7, July 1924, pp. 47-49, 3 figs. Requirements to be met in overcoming ravages of moth miller and beetles, with notes on successful practice in design of cooling apparatus for cold-storage rooms.

Ozone in. Ozone and Cold Storage, F. E. Hartman. Refrig. Eng., vol. 11, no. 5, Nov. 1924, pp. 173-179, 4 figs. Uses of ozone in cold storage; mechanism of ozone formation; and design and operating factors bearing on production of ozone.

Plants. Frozen Meat in Germany. Cold Storage, vol. 27, no. 311, Feb. 21, 1924, pp. 43-44, 5 figs. Brief description of Bremerhaven plant.

Italy's Largest Cold Store. Cold Storage, vol. 27, no. 312, Mar. 20, 1924, pp. 89-90 and 93, 5 figs. Description of Parma installation, for food products preservation.

Large Terminal and Cold-Storage Warehouse at Duluth. Eng. News-Rec., vol. 92, no. 8, Feb. 21, 1924, pp. 324-327, 4 figs. Rail and water terminal; reinforced-concrete structure with some steel framing; traffic on two levels; perishable freight; cold-storage insulation; freight-handling equipment.

Refrigeration at French Ports. Cold Storage, vol. 27, no. 311, Feb. 21, 1924, pp. 47-48, 2 figs. Notes on layout and equipment of Bordeaux-Bassens dock stores.

The Railway Cold Stores at Lyon-Perrache. Ice & Cold Storage, vol. 27, no. 310, Jan. 1924, pp. 11-13, 3 figs. Describes equipment of a French agricultural cold store to encourage local production.

Washington's Storage Plant. Refrig. World, vol. 59, no. 1, Feb. 1924, pp. 13-18, 14 figs. Describes new warehouse and raw-water ice plant of Terminal Refrig. & Warehousing Co.

Warehouses. See Plants; WAREHOUSES.

COLLOIDS

Chemistry of. Colloid Chemistry, E. K. Rideal. Roy. Soc. Arts—Jl., vol. 72, nos. 3752, 3753, and 3754, Oct. 17, 24, and 31, 1924, pp. 830-836, 838-844, and 849-854, 5 figs. Oct. 17: Phenomena and properties. Oct. 24: Consideration of suspension colloids in which solid phase is finely dispersed in either liquid or gaseous dispersion medium forming sols and smokes respectively. Oct. 31: Emulsions; electrical properties of gels.

Colloid Mill. Design and Operation of a Colloid Mill, Wm. A. McLean. Chem. & Met. Eng., vol. 30, no. 17, Apr. 28, 1924, pp. 675-677, 2 figs. See also Indus. & Eng. Chem., vol. 16, no. 5, May 1924, pp. 494-497, 2 figs. Describes mill which is invention of F. J. E. China, of London; a hydraulic disintegrator in which several forces are developed as well as electric effect, and in combined resolution substances are reduced to colloidal state; chemical reactions; power consumptions; industrial uses.

The Colloid Mill. Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1931, May 23, 1924, pp. 619-621. The "beater-wheel" type in technical and patent literature; mode of operation; use of accelerators or dispersators; applications in foodstuff industries; clays and fertilizer products; preparation of cellulose derivatives; lubricants, rubber, inks, and glues; preparation of "liquid coal"; colloidal metal, and other powders.

Colloidal Protection. Colloidal Protection, J. Alexander. Chem. & Industry, vol. 43, no. 51, Dec. 19, 1924, pp. 1256-1258. Notes on double or plural protection; autoprotection; and cumulative protection.

Developments. Splendid Progress in Field of Colloids. Chem. & Met. Eng., vol. 30, no. 26, June 30, 1924, pp. 1020-1021. Brief review of outstanding papers. Colloid adsorption classified; grain size in photo emulsions; properties of clay; acid and alkali adsorption; emulsions without colloids.

Ferric-Oxide Sols. Constitution and Stability of Ferric-Oxide Sols (Konstitution und Stabilität von Eisenoxydsolen), W. Pauli and F. Rogan. Kolloid-Zeit., vol. 35, no. 3, Sept. 1924, pp. 131-138. Quantitative study of coagulation of colloidal solutions of ferric hydroxide by potassium chromate and sodium oxalate.

Gelatinization Process. Kinetics of Gelatinization and Its General Significance (Die Kinetik der Gelatinierung und ihre allgemeine Bedeutung), R. Reiger. Kolloidchemische Beihefte, vol. 19, no. 10-12, 1924, pp. 381-440, 27 figs. Gives evidence to show that gelatinization process is not simple, but consists of series of successive reactions occurring in distinct stages. Curves showed evidence of discontinuities, and could be divided into three distinct portions; discusses evidence for existence of similar discontinuities in other colloidal systems.

Gels. Deformations of Elastic Gel Bodies on Drying (Die Deformationen elastischer Gelkörper beim Trocknen), E. Hatschek. Kolloid-Zeit., vol. 35, no. 2, Aug. 1924, pp. 67-76, 13 figs. Discusses behavior of gels on drying, showing various distortions of shapes, and explains how to avoid them by choice of appropriate forms.

Osmotic Pressure and Flocculation. The Theory of Osmotic Pressure, Membrane Potential and the Flocculation of Colloids (Zur Theorie der osmotischen Drucke, der Membranpotentiale und der Ausflockung von Kolloiden), N. Bjerrum. Zeit. für physikalische Chemie, vol. 110, 1924, pp. 656-684, 1 fig. Investigations on colloidal chromic hydroxide; in flocculation with polyvalent ions; precipitation zone is found to be narrow, well-defined, and independent of time; amount of ferrocyanide ions necessary for complete flocculation corresponds closely to total charge of colloid.

Papermaking and. See PAPER MANUFACTURE, Colloids and.

Particle, Formation and Properties of. Some Recent Advances in the Field of Colloids. Chem. Revs., vol. 1, no. 3, Oct. 1924, pp. 249-275, 9 figs. Formation of particle; colloid particle as a molecular kinetic unit; and colloid particle as micell. Bibliography.

Science and Technology. Colloidal Science and Technology (Kolloidwissenschaft und Technik), W. Ostwald. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 20, May 17, 1924, pp. 481-484. Scientific study of colloids; different kinds of colloids; change in properties of a body under disintegration; physical and chemical behavior; influence of these changes on technical processes.

Silica Gels. Silica as an Industrial Adsorbent, E. C. Williams. Chem. & Industry, vol. 43, no. 16, Apr. 18, 1924, pp. 97T-112T, 12 figs. Deals with possibilities of its employment for recovery of benzene hydrocarbons from coal gas or coke-oven gas for use as automobile fuel. Report of work carried out on behalf of Joint Research Committee of Nat. Benzole Assn. & Univ. of Leeds.

Silicic-Acid Sols. Silicic Acid Sol and a New Method for Its Preparation (Ueber das Sol der Kieselsäure und eine neue Methode zu seiner Darstellung), Rob. Schwarz. Kolloid-Zeit., vol. 34, no. 1, Jan. 1924, pp. 23-29. Solubility of silicic acid, prepared from silicon tetrafluoride, was determined in ammonia solutions of various concentrations; sols of silicic acid can be prepared by allowing solution in ammonia to evaporate slowly over dilute sulphuric acid.

Sugar Manufacture. Colloids in Cane and Beet Sugar Manufacture, H. S. Paine, M. S. Badollet and J. C. Keane. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1252-1258, 1 fig. Data involving following criteria and testing methods were obtained: dialysis, ultrafiltration, cata-

phoresis, gold number, surface tension; information was gained regarding approximate composition of various colloid fractions separated from different factory products.

Viscosity. Viscosity and Elasticity of Colloidal Solutions (Über die Zähigkeit und Elastizität kolloider Lösungen), H. Freundlich and E. Schalek. Zeit. für Physikalische Chemie, vol. 108, no. 3-4, Feb. 15, 1924, pp. 153-173, 7 figs. By assuming constant elasticity of flow, connection between magnitude of resistance and head of velocity of elastic liquids can be calculated.

COLOR

Systems. Objects of Color Systems (Ueber einige Aufgaben der Farbenlehre), J. von Kries. Zeit. für Technische Physik, vol. 5, no. 8, 1924, pp. 327-349, 1 fig. Discusses physical nature of light, light sensations, physical definition of visible colors, color systems, including Ostwald, heterochromous photometry brightness and intensity of light, etc.

COLUMNS

Buckling of. Calculation of Columns Under Buckling Load (Berechnung gegliederter Säulen, die auf Knickung beansprucht werden), F. Röpke. Praktische Maschinen-Konstrukteur, vol. 57, nos. 18, 19-20, and 22, May 20, June 4, and 17, 1924, pp. 245-247, 266-270, and 310, 30 figs. Develops fundamental equation of Euler's formula and shows by diagrams effect of transverse forms occurring; also gives examples of Tetmayer and Krohn formulas and their application.

Notes on Moments in Pillars Due to Deflection of Beams Monolithic Therewith, O. Faber. Concrete & Constructional Eng., vol. 19, no. 6, June 1924, pp. 342-349, 5 figs. Explains bending of pillars due to deflection of beams monolithic with them.

Distilling. See DISTILLATION, Columns.

Eccentric Loads. Eccentric Loads on Columns, T. H. Fallows. Concrete & Constr. Eng., vol. 19, no. 9, Sept. 1924, pp. 583-585, 3 figs. Gives quick and reasonably accurate method of determining point of zero stress experimentally, for case where load acts on axis of symmetry of section.

Nomographic Charts for. Nomographic Column Charts, J. S. Newell. U. S. Air Service Information Circular, vol. 5, no. 446, Mar. 1, 1924, 10 pp., 10 figs. Charts made to facilitate design of wood, steel, or duralumin columns.

Reinforced-Concrete. A Case of Compound Flexure (Un caso particular de flexión compuesta), S. Bobrovsky. Ingenieria, vol. 28, no. 9, Sept. 1924, pp. 394-398, 3 figs. Calculation of flexure and compression in columns as used for workshops fitted with cranes or traveling bridges.

Calculation of Reinforced-Concrete Columns of Rectangular Construction (Cálculo de columnas de hormigón armado y sección rectangular), C. Loehle. Ingeniería y Construcción, vol. 2, no. 18, June 1924, pp. 245-248, 10 figs. Details of new methods of calculation, and examples.

The Effect Upon Cost and Size—Using More Cement in Reinforced-Concrete Columns, J. T. Thompson. Concrete, vol. 25, no. 5, Nov. 1924, pp. 180-181, 4 figs. Gives curves demonstrating that considerable savings in both money and floor space can be effected by making reinforced-concrete columns of a richer concrete than is customarily used in building practice.

Shoring and Removing. Methods Used in Shoring and Removing Heavily Loaded Columns, K. Johnson. Am. Architect & Architectural Rev., vol. 125, no. 2444, Apr. 23, 1924, pp. 411-415, 10 figs. How this work was done in connection with expansion of Exchange Nat. Bank of Tulsa building, Okla.

COMBUSTION

[See also CARBON DIOXIDE and CARBON MONOXIDE.]

Control. Automatic Combustion Control, J. Fred Weller. Combustion, vol. 11, no. 4, Oct. 1924, pp. 295-297. Deals with essential elements to be controlled, namely, fuel supply in proportion to steam demands, air supply, removal of gases, and maintaining negative furnace pressure.

Combustion Control, E. G. Bailey. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 483-487, 5 figs. Discusses problems of control.

Combustion Control Based on CO_2 in Gas, G. E. Gaster. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 768-769, 2 figs. Variations in CO_2 operate rheostat controlling speed of fan motor.

The Evils of Close Regulation in Automatic Combustion Control, T. A. Peebles. Power, vol. 60, no. 1, July 1, 1924, pp. 13-14. Points out that close regulation is desirable from viewpoint of production or utilization; on other hand, it tends to introduce wear, hunting or surging, and other undesirable conditions; this is particularly true of combustion-control apparatus.

Use of Combustion Control Devices Increases, R. J. S. Pigott. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1199-1203, 4 figs. Three principles for controlling ratio of air to fuel; classification of commercial systems; connection of regulator to control valves; connection to dampers or rheostats; opportunities for central control.

Fuels. See FUELS, Combustion.

Gaseous. See GASES, Combustion.

Molar Calculation. The Molar Calculation of Combustion Processes with Use of Nomograms (Die molare Berechnung von Verbrennungsvorgängen unter Verwendung von Nomogrammen), W. Otte. Wärme, vol. 47, no. 2, Jan. 11, 1924, pp. 11-14, 5 figs. Advantages of molar calculation; formulas; use of nomograms in connection with molar calculation of combustion processes; examples.

Problems. Some Combustion Problems in Glass Making, C. D. Smith. Am. Ceramic Soc.—Jl., vol. 7, no. 8, Aug. 1924, pp. 603-613, 4 figs. Advocates use of producer-gas equipment of recognized merit, gas mains of ample size with adequate facilities for cleaning or burning out, valves large enough to take care of requirements and with minimum resistance to exit gases, etc.

Spontaneous. Spontaneous Combustion; Diffusion of Gases, Wm. Galloway. So. Wales Inst. Engrs.—Proc., vol. 40, no. 4, Oct. 9, 1924, pp. 299-316, and (discussion), no. 5, Nov. 13, 1924, pp. 338-342. Gives explanation for generation of heat and ignition of gas which takes place when mixture of lighting gas and air comes into contact with platinum sponge; it is suggested that initial rise in temperature of coal which is absorbing oxygen is due, at least in early stage of heating, to compression of that gas in manner described, and not to any appreciable extent to process of combustion.

COMMUTATION

Brush Voltage and Current Density. Brush Voltage and Current Density under the Carbon during Commutation (Die Bürstenspannung und Stromdichte unter der Kohle bei der Kommutation), H. Lutz. Elektrotechnische Zeit., vol. 45, no. 10, Mar. 6, 1924, pp. 183-185, 5 figs. As resistance under carbon in constant state is inversely proportional to effective current density, resistance corresponds to commutation; momentary

deviation from effective current density produces, however, an additional tension, which can cause sparking; therefore straight-line commutation is desirable.

Mathematical Analysis of. A New Method of Investigation of the Commutation in Electrical Machines (En ny vei for kommuteringsteoriens utvikling), K. Faye-Hansen. Teknisk Tidskrift, vol. 54, no. 31, Aug. 2, 1924, pp. 143-146, 6 figs. (Elektroteknik). Mathematical analysis of commutation and particularly of changes of electric current in short-circuited coil; consideration is given to occurring higher harmonics.

Theory. Improvement of the Theory of Commutation (Ein neuer Weg zum Ausbau der Kommutierungstheorie), L. Dreyfus. Archiv für Elektrotechnik, vol. 13, no. 5, Aug. 22, 1924, pp. 358-365, 6 figs. Also (discussion) pp. 348-355, 5 figs. Application of new commutation theory in practice; conditions for favorable commutation calculated from reversing field; etc. Reference to preceding part given in Eng. Index, 1923, p. 170.

COMMUTATORS

Angle Gage for. See GAGES, Sine-Bar.

Heating of. The Measurement of the Heating of Dynamo Commutators (Sur la mesure de l'échauffement des collecteurs de génératrices électriques), H. Robert, P. Vernotte and A. Jeufroy. Académie des Sciences—Comptes Rendus, vol. 179, no. 11, Sept. 15, 1924, pp. 525-527, 1 fig. Compares method used in commercial testing, employing thermometers, with measurements made with thermocouple of very fine wires; curves are given showing relation between readings and time for two machines of different outputs, one of which was run at full and at reduced load; there is no simple relation between readings, and it is clear that commercial tests may in some cases be very misleading.

Motor-Driven, Double. A Motor Driven Double Commutator, A. P. Carman. Optical Soc. of America & Rev. Sci. Instruments—Jl., vol. 9, no. 2, Aug. 1924, pp. 175-178, 3 figs. Device for charging and discharging two electrical condensers in unison and with uniform frequency.

Small, Manufacture of. The Manufacture of Small Commutators. Machy. (Lond.), vol. 24, no. 614, July 3, 1924, pp. 429-431, 9 figs. Series of operations in systematic assembly of commutators for fractional horsepower electric motors.

COMPASSES

Aircraft. The Compass in Aircraft. Conclusions from Development of Sea Compass in Theory and Practice (Der Kompass im Luftfahrzeug. Folgerungen aus der Entwicklung des Seekompasswesens nach Theorie und Praxis), H. Meldau. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, nos. 13-14 and 15-16, July 26 and Aug. 26, 1924, pp. 147-150 and 167-170, 3 figs. Discusses theory of deviation and its fundamental equations by Poisson, compensation, determination of coefficients, arrangement of needle, kinetic problem, function of compass in aviation. Includes discussion.

Autographic. See Nautograph.

Earth Inductor. The Pioneer Earth Inductor Compass. Aviation, vol. 16, no. 23, June 9, 1924, pp. 616-617, 5 figs. Instrument used by American world fliers in spanning Pacific from Alaska to Japan.

Geological Work. New Type of Compass for Geological and Topographical Work (Nuovo tipo di bussola per geologi e topografi), G. Merciai. Rassegna Mineraria Metallurgica e Chimica, vol. 60, no. 6, June 15, 1924, pp. 118-123, 4 figs. Instrument uniting all advantages of various compasses for geology and applicable to rapid topographical work; details of construction and operation.

Nautograph. The Baule Nautograph (Le Nautographe Baule). Nature (Paris), no. 2620, June 21, 1924, pp. 389-393, 5 figs. Describes new apparatus by Lieut. Baule which automatically and continuously traces course of a ship on a map.

Radio. Radio Compasses on Tankers. Min. & Oil Bul., vol. 10, no. 8, Aug. 1924, pp. 802-803 and 871, 3 figs. Determining ship's position, even during dense fog, is possible with new radio compass, which is being adopted by number of California oil companies for use on tankers.

COMPENSATORS. See ELECTRIC MEASURING INSTRUMENTS, A. C. Compensators.

COMPRESSED AIR

Apparatus, After-Coolers for. After-Coolers as a Means of Removing Moisture from Compressed Air, L. H. Geyer. Nat. Engr., vol. 28, no. 11, Nov. 1924, pp. 535-537, 3 figs. Functions of after-coolers and their relation to efficiency of compressed-air plant. Construction details and cooling water required.

Applications. Utilization of Compressed Air (Utilisation de l'air comprimé), P. E. Leroux. Arts et Métiers, vol. 77, nos. 42, 43, and 44, Mar., Apr., and May 1924, pp. 105-119, 135-157, and 174-185, 90 figs. Design, construction and operation of compressed-air shovels, tipples, conveyors, mine locomotives, etc.

See also CONSTRUCTION WORK, Pneumatic Equipment, Application of.

Coal Mines. Compressed Air Haulage in the Coal Mines of Western Canada, S. A. Williams. Can. Min. Jl., vol. 45, no. 31, Aug. 1, 1924, pp. 749-751, 4 figs. Details of compressed-air locomotives first at Coleman, Alberta, and other places, air compressors and pipe lines.

The Rhymney Valley Compressed-Air Installation, E. L. Hann. Instn. Min. Engrs.—Trans., vol. 67, part 5, Aug. 1924, pp. 442-456, 8 figs. Describes installation which serves group of 11 coal mines.

Construction Work. Field of Application of Compressed Air in Construction Work (Anwendungsgebiete der Druckluft in Baubetrieb), M. Hübler. Bauingenieur, vol. 5, no. 10, May 31, 1924, pp. 295-299. Discusses use of compressed air (1) for producing workroom free from water, (2) for driving machine tools, (3) for conveying materials of all kinds.

Cotton Mills. Compressed Air Has Many Uses in the Cotton Mill, B. R. Burnham. Compressed Air Mag., vol. 29, no. 8, Aug. 1924, pp. 943-946, 10 figs. Illustrates some of varied ways in which engineering cunning has cheapened and increased production.

Foundry Equipment. Pneumatic Apparatus Speed Up Performance in the Foundry, S. G. Roberts. Compressed Air Mag., vol. 29, no. 7, July 1924, pp. 933-936, 13 figs. Discusses pneumatic equipment of Malleable Iron Fittings Co., Branford, Conn., including air-operated riddles, knock-out vibrators, jet cleaners and sprayers, etc.

Improved Practice. Possibilities of Improvement in Compressed-Air Practice (Verbesserungsmöglichkeiten im Druckluftbetriebe), A. Hinz. Glückauf, vol. 60, nos. 15 and 16, Apr. 12 and 19, 1924, pp. 279-284 and 304-308, 2 figs. After brief discussion of costs of compressed-air operation, author investigates whether economy can be increased through improvements of compressor and motors; no advantages are obtained from higher air pressure, as work with lower pressures is more economical; great advantages result from utilization of air expansion which is only possible with minimum water content of compressed air, due to danger of freezing.

Improvements. Improvements in Compressed-Air Practice (Neuerungen im Pressluftbetrieb). Schiffbau, vol. 25, no. 10, Feb. 27, 1924, pp. 230-233, 8 figs. Improvements in compressors of small and medium output constructed by Frankfurt Maschine-Building Corpn.; improvements in compressed-air piping, and in pneumatic tools.

Machinery. Air Machinery, A. Hinz. Mech. Eng., vol. 46, no. 7, July 1924, p. 417. Possibilities of improvements in compressed-air plant operation. Translated and abstracted from Glückauf, nos. 15 and 16, Apr. 12 and 19, 1924.

Measurement. A New Compressed-Air Measuring Method (Ein neues Druckluft-Messverfahren), E. Stach. Glückauf, vol. 60, no. 14, Apr. 5, 1924, pp. 260-262, 3 figs. New method and equipment for determining compressed-air consumption in relation to suction volume in a pipe line or a machine; pressure fluctuations are without influence on measurement results.

Meters. Compressed-Air Meters (Pressluftmesser), A. Grossmann. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 249-250, 4 figs. Comparisons between compressed-air meters with and without shock-absorbing air chamber; points to incorrect results obtained with meters when compressed-air tool is directly attached, and favorable results obtained by attachment of shock-absorbing air chamber.

Mine Installation. See COAL MINES, Compressed-Air Installation.

Piping for. See PIPING, Compressed-Air, Calculation of.

Pneumatic Mail Tubes. Progress in Pneumatic-Mail-Tube Technology (Fortschritte der Rohrpost-Technik), H. Schwaighofer. Schweizerische Bauzeitung, vol. 83, no. 5, Feb. 2, 1924, pp. 55-58, 4 figs. Describes principal improvements in municipal pneumatic mail tube of Munich, Germany, as example of modern technical development.

COMPRESSORS

Air. See AIR COMPRESSORS.

Ammonia. See AMMONIA COMPRESSORS.

Carbon Dioxide. See REFRIGERATING MACHINES, CO_2 Compressors.

CONCRETE

Admixtures in. Calcium Chloride as an Admixture in Concrete, Duff A. Abrams. Lewis Inst., Structural Materials Research Laboratory—Bul., no. 13, Nov. 1924, 57 pp. 16 figs. See also abstract in Contract Rec. & Eng. Rev., vol. 38, no. 33, Aug. 13, 1924, pp. 814-815. Results of investigations to determine effects of calcium chloride and other compounds on compressive strength of concrete. Bibliography.

Aggregates. Analysis of Grading Curve for Concrete Aggregates, L. I. Hewes. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 222-262, 2 figs. Mathematical study of size gradation of sand and stone to coördinate various measures of grading such as fineness modulus, surface area, and density ratio.

Chert Unfit for Coarse Aggregate in Concrete, F. V. Reagel. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 332-334, 1 fig. Origin of flints and cherts, distribution, occurrence and characteristics. Experiments and tests in Missouri highway work show chert causes decomposition in surface after freezing.

Concrete and Concrete Aggregates, R. N. Van Winkle. Pit & Quarry, vol. 9, no. 5, Dec. 1, 1924, pp. 81-84. Results of compression tests of concrete made with trap rock and soft limestone, two extremes in aggregates, and of tests to compare strength of gravel and stone concrete. Mixing of concrete.

Field Control of Concrete Aggregates in Concrete Highway Construction, R. W. Crum. Good Roads, vol. 66, no. 2, Feb. 1924, pp. 41-43 and 58, 4 figs. Standard practice in Iowa.

Grading Aggregates by Fineness Modulus Method, C. D. Willett. Eng. News-Rec., vol. 92, no. 24, June 12, 1924, pp. 1010-1011, 3 figs. Abrams theory supplemented by charts for three sizes of aggregates; scientific method of proportioning made easy.

See also SLAG, Blast-Furnace.

Alkali Action. Protection of Concrete Against Alkali, E. C. E. Lord. Pub. Roads, vol. 5, no. 3, May 1924, pp 23-25. See also Concrete Products, vol. 26, no. 6, June 1924, pp. 39-41. Water-gas and coal tars and paraffin treatments investigated. Progress report of two series of tests by U. S. Bur. of Pub. Roads.

Volume Change a Measure of Alkali Action, G. Miller. Pub. Roads, vol. 5, no. 4, June 1924, pp. 12-13 and 17, 3 figs. Effect on concrete measured by changes in length.

Blocks. See CONCRETE BLOCKS.

Broken-Stone, Permeability Tests. Permeability Tests on Broken Stone Concrete, M. O. Withey and C. A. Wiepking. Univ. of Wis.—Bul., no. 1245, Eng. Series, vol. 9, no. 2, 1923, 55 pp., 15 figs. Description of tests made in 1914 and 1915 and results obtained.

Calcium Chloride in. Use of Calcium Chloride in Concrete as a Protection Against Cold (Klorkalciums användning vid cement- och betongarbeten såsom skyddsmedel mot köld), R. V. Frost. Teknisk Tidskrift, vol. 54, nos. 4 and 8, Jan. 26 and Feb. 23, 1924, pp. 3-6, and 15-18 (Väg- och Vattenbyggnadskonst), 1 fig. Freezing temperatures for concrete with different percentages of calcium chloride are given, as well as tests of strength of various samples.

Cement Addition. The Addition of Cement as a Means of Increasing Concrete Workability, Duff A. Abrams. Contract Rec. & Eng. Rev., vol. 38, no. 39, Sept. 24, 1924, pp. 946-947, 1 fig. Experiments at Lewis Inst. lead to conclusion that it is more economical to obtain desired workability by means of cement than by use of other admixtures.

Cement Content. Determining the Cement Content of Concrete, H. F. Kriege. Eng. News-Rec., vol. 92, no. 21, May 22, 1924, pp. 892-893. Chemical method of analyzing concrete based on silica content; check results given.

Cement Methods. Mortar and Concrete, W. Fisher. Cornell Civ. Engr., vol. 32, no. 8, May 1924, pp. 103-106, 110 and 121, 3 figs. Deals with proper cement methods.

Construction. See CONCRETE CONSTRUCTION; CONCRETE CONSTRUCTION, REINFORCED.

Contraction and Swelling. Volumetric Changes, Strength and Impermeability of Concrete with the Use of Portland Cement and High-Grade Clay Cement (Ueber Volumenveränderungen, die Festigkeit und die Wasserdichtigkeit von Beton bei Verwendung von Portland-Zement und dem hochwertigen Tonerde-Zement), A. Hummel. Bauingenieur, vol. 5, no. 5, Mar. 15, 1924, pp. 110-116, 13 figs. Results of investigations of contraction and swelling of cement, cement mortar, and concrete.

Curing. Tests Show How Damp-Sand Curing Improves Quality of Concrete, F. D. Crook and H. Faulkner. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1050-1051, 4 figs. Effect of oil on pavements shown by tests on small blocks. Impermeability depends largely on method of curing.

See also Portland-Cement.

Efflorescence. Efflorescence or "Bloom." Concrete, vol. 25, no. 3, Sept. 1924, pp. 86-87. Its causes, prevention, and removal.

Elasticity. Experimental Investigations on the Coefficient of Elasticity of Concrete (Recherches expérimentales sur le coefficient d'élasticité du béton), G. Magnel. Revue Universelle des Mines, vol. 67, no. 1, Jan. 1, 1924, pp. 38-40, 2 figs. Results show that with concrete aged between 3 months and 1 year resistance is slightly increased and during same time coefficient of elasticity remains practically constant; permanent deformation under same load is much less with 1 year than with 3 months of aging.

The Modulus of Elasticity in Compression of Concrete, W. D. Womersley. Concrete & Constr. Eng., vol. 19, no. 9, Sept. 1924, pp. 553-556, 2 figs. Experiments to determine elastic constants of concrete.

Friction Tests. Friction Tests of Concrete on Various Subbases, A. T. Goldbeck. Public Roads, vol. 5, no. 5, July 1924, pp. 19-20 and 23, 1 fig. Discusses determination of frictional resistances as a step toward rational design of concrete pavement; describes specimens and method of tests; frictional resistance lowered by wet subbase.

Gypsum. See BUILDING MATERIALS, Structolite.

Hydrated Lime in. The Use of Hydrated Lime With Portland Cement, J. W. Ramsey. Architectural Forum, vol. 40, no. 3, Mar. 1924, pp. 125-128. Results of tests made on addition of hydrated lime to mortars and concrete. Hydrated lime for waterproofing.

Impure Mixing Waters. Does Impure Water Affect Concrete? D. A. Abrams. Contract Rec. & Eng. Rev., vol. 38, no. 24, June 11, 1924, pp. 599-600. Strength tests, using mixing water of a wide range of types, indicate that there is not the variation that might be expected. Is not a question of presence of impurities so much as of their amount. From Am. Concrete Inst.—Proc., vol. 20, 1924.

Impure Waters for Mixing Concrete. Concrete & Constructional Eng., vol. 19, no. 8, Aug. 1924, pp. 527-529. Conclusions from exhaustive tests on effect of using impure water for mixing concrete, undertaken by Prof. Duff Abrams, Lewis Inst., Chicago.

Impure Waters for Mixing Concrete, D. A. Abrams. Can. Engr., vol. 46, no. 25, June 17, 1924, pp. 617-618. Also Concrete, vol. 24, no. 6, June 1924, pp. 241-243. Description and results of tests of portland-cement concrete using mixing water of wide range of types, many of which were thought to be unsuitable; principal conclusions from tests.

Tests of Impure Waters for Mixing Concrete, Duff A. Abrams. Lewis Inst., Structural Matls. Research Laboratory.—Bul., no. 12, Sept. 1924, 44 pp., 7 figs. Strength tests on portland cement were made at ages of 3 days to 2 1/3 years using mixing waters of wide range of types, many of which were thought to be unsuitable for use in concrete; 68 samples of water were tested, including sea and alkali waters, bog waters, mine and mineral waters, waters containing sewage and industrial wastes, and solutions of common salt; tests of fresh waters (including distilled) were made for purpose of comparison.

Mixers. See CONCRETE MIXERS.

Mixing. See Impure Mixing Waters; Proportioning.

Moist Sands. The Bulking of Moist Sands, A. A. Levison. Public Roads, vol. 5, no. 5, July 1924, pp. 21-23, 5 figs. Effect of phenomenon on strength and yield of concrete.

Novocrete. Laboratory Tests on Novocrete. Eng. & Contracting (Buildings), vol. 62, no. 4, Oct. 22, 1924, pp. 896-898. A product composed of portland cement and specially treated, known in United States and Canada by name of "Novocrete" or "mineralized" sawdust, and in Europe as "Durocrete." Characteristics, uses, and results of different tests made.

"Mineralized Sawdust" Aggregate for Concrete. Concrete, vol. 25, no. 3, Sept. 1924, pp. 106-107. Data on a new kind of concrete called Novocrete, having mineralized sawdust as an aggregate, and results of different tests made with it.

Pavements. See PAVEMENTS, CONCRETE.

Portland-Cement. Portland Cement Concrete, W. E. Hart. Armour Engr., vol. 15, no. 3, Mar. 1924, pp. 95-96 and 110-111, 4 figs. Notes on old and newer practice in manufacture of concrete, placing concrete, and curing of concrete after placing.

Production Developments. Some Developments in Making Concrete. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 448-451. Abstracts of papers and committee reports read before Am. Concrete Inst. as follows: Principles of Design of Concrete Plant; Suggestions for Producing Better Concrete; Field Tests of Concrete, J. G. Ahlers and S. Walker; Economic Value of Admixtures in Concrete, J. C. Pearson and F. A. Hitchcock; Weighing Concrete Aggregates on Highway Pavements, R. W. Crum.

Products Manufacture. The Economical Manufacture of Quality Concrete Products, E. W. Dienhart. Concrete, vol. 24, no. 5, May 1924, pp. 182-188, 10 figs. Discusses factors which influence strength of concrete, viz., quality of aggregate, grading of aggregate, quantity of cement, quantity of mixing water, time of mixing, and curing. From paper presented at Wis. Concrete Products Assn. convention.

Proportioning. Concrete Methods on the C. C. C. & St. L. Ry., J. B. Hunley. Eng. & Contracting (Bldgs.), vol. 61, nos. 3 and 4, Mar. 26 and Apr. 23, 1924, pp. 681-691 and 871-879, 5 figs. Old and new practices, with especial reference to proportioning. Notes on designing concrete mixtures.

How the Big Four Proportions Concrete. Ry. Eng. & Maintenance, vol. 20, no. 10, Oct. 1924, pp. 387-392, 6 figs. Improved methods adopted by Big Four and applied on all concrete construction; instructions for designing concrete mixtures; specimen design of concrete mixture.

Mixing Concrete for Power Plant Use. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1013-1014, 1 fig. Many uses arise around power plant where concrete, properly made, affords excellent construction. Fundamental principles of good construction.

Research. How One Industry Concentrates Its Research, D. A. Abrams. Chem. & Met. Eng., vol. 31, no. 14, Oct. 6, 1924, pp. 539-542, 4 figs. Structural Materials Research Laboratory of Chicago is working out important facts about portland cement and concrete; 45,000 tests are being made annually; describes some experiments and investigations made.

Rubberized. British Experiments With Rubberized Concrete, W. H. Gordon. Cement & Eng. News, vol. 36, no. 1, Jan. 1924, pp. 47 and 49. Some uses. Combination might yield added resilience for flooring and road material; also lining cast-iron and steel water pipe with concrete layer.

Sand, Selection of. Sand and Gravel in the Pittsburgh District. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 2, Mar. 1924, pp. 56-92 and (discussion) 93-102. Contains following papers: Selection of Sand and Gravel for Concrete in the

Pittsburgh District, by C. M. Reppert; Production of River Sand and Gravel, A. W. Dann; Tests to Determine Suitability of Fine and Coarse Aggregate, P. J. Freeman; Concrete and Concrete Materials, J. J. Paine; Control and Records of Concrete Construction, J. D. Stevenson; Municipal Practice in Testing Sand and Gravel Proposed for Use in Concrete, F. W. Lyon.

Sea-Water Action. Concrete in Sea Water, A. G. Tapley. Eng. Jl., vol. 7, no. 11, Nov. 1924, pp. 663-672, 5 figs. Results of tests of specimens of concrete placed in St. John harbor.

Destruction of Concrete by Sea Water (Die Zerstörung von Beton durch Meerwasser), O. Gassner. Tonindustrie-Zeitung, vol. 48, nos. 43, 49, 52, and 54, May 28, June 18, 28, and July 5, 1924, pp. 467-470, 528-531, 569-573, and 591-593, 2 figs. Discusses composition and action of sea water; Michaelis' theory of detruction, viewpoints for and against it and interpretation of other theories of destruction and contradictory views held. Theory of current bacillus and evidence in support of it.

The Action of Sea Water on Concrete. Concrete & Constructional Eng., vol. 19, no. 4, Apr. 1924, pp. 249-256. Discusses the subject under following headings: Impermeability and density; proportioning and mix; quantity of water; forms, spading and tamping; curing; proper location and percentage of steel; avoidance of seepage or drainage action; effect of alternate action of air and water during setting; exterior protection of concrete; cement.

Specifications. Standard Specifications for Concrete and Reinforced Concrete. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 8, Oct. 1924, pp. 1163-1284, 30 figs. See also Am. Ry. Eng. Assn.—Bul., vol. 26, no. 269, Sept. 1924, pp. 15-85, 17 figs. Submitted by joint committee on standard specifications. General instructions; definitions; quality of concrete; materials; proportioning and mixing; depositing concrete; forms; details of construction; waterproofing and protective treatment; surface finish; design; includes tables on grading of fine and coarse aggregate, size and areas of reinforcement bars, proportions for and workability of concrete, and moments to be used in design of flat slabs. Mandatory and advisory appendices.

Steel Concrete. Steel Concrete as a Building Material ("Stahlbeton" als Baumaterial), A. Kleinlogel. Gas- u. Wasserfach, vol. 67, no. 33, Aug. 16, 1924, pp. 487-490, 7 figs. Discusses new kind of concrete yielding homogeneous iron-like mass of great density approaching composition of cast iron, known as "steel-concrete," and gives examples of its application.

Strength. Making Quality Products Economically, E. W. Dienhart. Cement & Eng. News, vol. 36, no. 2, Feb. 1924, pp. 32-36 and 54, 10 figs. Discussion of factors which influence strength of concrete.

Tests. Compression and Tensile Strength Tests of Concrete by Means of a Micro-comparator (Druck- und Zugversuche an Beton mit Mikrokomparator), K. Eisenmann. Bauingenieur, vol. 5, no. 17, Sept. 15, 1924, pp. 540-545, 5 figs. Discusses measurement of compression and tensile stresses on concrete beams mixed 1:4; variation of coefficient of elasticity; etc.

Test Concrete on Five Eastern Jobs. Am. Contractor, vol. 45, no. 26, June 28, 1924, pp. 26-28, 4 figs. Details of tests made as part of general investigation to establish means of introducing into job practice some of improvements in concrete making, and to determine practicability of securing desired strengths in field. Planned and carried out by Structural Mtls. Research Lab., Chicago.

Trass Addition. Evaluation and Use of Trass (Zur Bewertung und Verwendung des Trasses), H. Bach. Tonindustrie-Zeitung, vol. 48, nos. 68, 72, 75, and 94, Aug. 23, Sept. 6, 17, and Nov. 22, 1924, pp. 739-740, 782-783, 820-821, and 1103-1104. Discusses increased use of trass in concrete and mortar, elimination of ineffective ingredients, shorter form of testing than that of trass standards. Hydrate water content of trass and its effect on properties of trass; tests of lime-trass; sand mixtures; effect of trass addition to mortars.

CONCRETE BLOCKS

Hollow. See HOUSES, Concrete-Brick.

Shrinkage. Shrinkage Effect in Concrete and Reinforced-Concrete Bodies (Ueber Schwindwirkungen in Beton- und Eisenbetonkörpern), M. Koenen. Beton u. Eisen, vol. 23, no. 1, Jan. 5, 1924, pp. 1-6, 12 figs. Discusses hygroscopicity and shrinkage, shrinkage in concrete, reinforced concrete under load and without load, and stresses due to shrinkages.

CONCRETE CONSTRUCTION

Bulkheads. Concrete Sheetpile Levee Wall at New Orleans, W. M. Peters. Eng. News-Rec., vol. 93, no. 7, Aug. 14, 1924, pp. 257-258, 4 figs. Bulkhead of tongued and grooved piles jetted down and grouted, built by Illinois Central R. R. for about a mile along river front adjacent to its Stuyvesant Docks at New Orleans, La., avoids raising river levee and wharf.

Reducing the Cost of Concrete Bulkheads, T. Aston. Concrete, vol. 25, no. 1, July 1924, pp. 28-30, 5 figs. Develops hollow stepped-down concrete wall for use as bulkhead for wharves, retaining walls, and the like. Shows step wall system, as applied to dam walls, gives cheaper construction than standard types of dam walls

Coal Bunkers. See COAL STORAGE, Bins.

Coal Mines. See COAL MINES, Concrete Construction.

Cold Weather. See BUILDING CONSTRUCTION, Concrete, Cold-Weather; CONCRETING, Cold-Weather.

Expansion Joints. See JOINTS, Concrete Expansion.

Marine Structures. Shingle Beaches and the Wear of Concrete, J. S. Owens. Engineer, vol. 138, no. 3580, Aug. 8, 1924, pp. 157-158, 3 figs. Describes method for concrete structures erected on foreshore and exposed to grinding action of shingle or boulders, which has been used successfully and aim of which has been to provide for concrete a surface that would (1) resist abrasive action of shingle as much as possible consistent with limitations as to cost and (2) permit of easy renewal when worn.

Muscle Shoals Power Development. The World's Largest Concrete Job. Contract Rec. & Eng. Rev., vol. 38, no. 33, Aug. 13, 1924, pp. 810-812. Muscle Shoals power development in Alabama involves placing of 1,291,385 cu. yd. of concrete; unusually excellent results are being obtained.

Pouring. See BRIDGES, CONCRETE, Pouring Method.

Precast Monolithic System. More About the Nel-Stone Precast Monolithic System. Concrete Products, vol. 24, no. 3, Mar. 1924, pp. 45-46 and 55, 10 figs. Chief object of this construction system is to eliminate form work in monolithic concrete structures of all kinds, thereby materially reducing construction time and cutting cost nearly in half.

Swiss Alps. Handling Concrete Materials in the Swiss Alps, S. A. Nutter. Eng. News-Rec., vol. 92, no. 3, Jan. 17, 1924, pp. 102-105, 6 figs.

Mountainous conditions make ordinary methods impracticable; long cableways, incline and narrow-gage railways used to reach site of dam construction; movable-tower cableway.

Temperature Changes. Temperature Changes in Concrete Bodies due to Setting Temperature, Surrounding Temperature and Solar Heat (Temperaturänderungen in Betonkörpern infolge der Abbindewärme und unter dem Einfluss der Umgebungstemperatur und der Sonnenbestrahlung), W. Lydtin. Bauingenieur, vol. 5, nos. 23 and 24, Dec. 10 and 25, 1924, pp. 760-765 and 795-801, 12 figs. Extent and distribution of temperature changes in concrete construction; connection between drop in temperature after setting and shrinkage of concrete.

CONCRETE CONSTRUCTION, REINFORCED

Boiler Houses. Reconstruction of Boiler Houses Using Reinforced-Concrete Construction (Der Umbau von Kesselhäusern unter Verwendung von Eisenbetonkonstruktionen), E. Vögler and A. Konrad. Beton u. Eisen, vol. 23, no. 16, Aug. 20, 1924, pp. 209-213, 13 figs. Details of methods adopted at Mathias Stimes mine, underpinning, development of elastic joints, bunkers, etc.

Buildings. See BUILDING CONSTRUCTION, Reinforced-Concrete; BUILDINGS, Concrete.

Buildings, Restoration of. See CEMENT, Spraying.

Calculations. The Use of Polar Coördinate Systems for Technical Calculations (Polära koordinatsystems användning för beräkning av formelvärden), H. Faxén. Teknisk Tidskrift, vol. 54, no. 43, Oct. 25, 1924, pp. 116-118 (Väg- och Vattenbyggnadskonst), 5 figs. Describes system of polar coördinates particularly adapted for calculations of reinforced-concrete structures. A device is used, the polar calculator, consisting of two movable disks, upper one being transparent, logarithmic curves being drawn on each disk.

Chimneys. See CHIMNEYS.

Cinder Concrete Unit Test. Cinder Concrete Units Fire and Water Test. Concrete, vol. 24, no. 1, Jan. 1924, pp. 25-27, 4 figs. Abstract of report by A. H. Beyer of 3-hr. fire and water test made upon two partitions built of precast reinforced cinder concrete units erected by Non-Burnable Building Products Co., Inc., Yonkers, N. Y.

Cost Estimating. Estimating the Cost of Reinforced Concrete, C. F. Dingham. Contract Rec. & Eng. Rev., vol. 38, no. 1, Jan. 2, 1924, pp. 1-4. Practical data that will enable contractor to figure on forming, placing, reinforcing and finishing concrete walls, slabs, and columns.

Cross-Sections, Dimensioning. The Dimensioning of Rectangular Reinforced-Concrete Cross-Sections for Bending with Axial Force (Dimensionierung rechteckiger Eisenbetonquerschnitte für Biegung mit Achsialkraft unter Berücksichtigung des Minimums für $f_e + f'_e$), R. Jahn. Bauingenieur, vol. 5, no. 6, Mar. 31, 1924, pp. 137-141. Extension of the Ehler tables for excentrically compressed or drawn rectangular cross-sections.

The Dimensioning of Reinforced-Concrete Cross Sections (Beitrag zur Bemessung von Eisenbetonquerschnitten), R. Saliger. Bauingenieur, vol. 5, no. 7, Apr. 15, 1924, pp. 162-166, 2 figs. Method of calculation and its advantages.

Deformation under Elongation. Deformation of Reinforced Concrete under Elongation (Les déformations du béton armé soumis à l'extension), H. Lossier. Génie Civil, vol. 84, no. 19, May 10, 1924, pp. 445-447, 7 figs. Results of investigations made in France and other countries during recent years on large top-boom trusses and on bowstring arches.

Fire Resistance of. Reinforced Concrete and Fire-Resistance, J. Singleton-Green. Concrete & Constructional Eng., vol. 19, no. 3, Mar. 1924, pp. 156-161. Conclusions derived from previous articles, and additional data.

Formwork Design. Design of Formwork for Reinforced Concrete Construction, A. E. Wynn. Concrete & Constr. Eng., vol. 19, nos. 9, 10, 11, and 12, Sept., Oct., Nov., and Dec. 1924, pp. 568-573, 639-644, 717-731, and 788-794, 11 figs. Sept.: Form building in general. Oct.: Materials, loads, pressures and stresses. Nov.: Theoretical design of forms. Dec.: Design tables.

Gas Works. Concrete Piles for Gas Works Foundations, J. F. Springer. Gas Age-Rec., vol. 54, no. 12, Sept. 20, 1924, pp. 385-388 and 390, 5 figs. General discussion of concrete as construction material for gas-works purposes.

Grandstands. Building the Nebraska University Concrete Stadium. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 498-500, 6 figs. Plant layout and form design and construction for reinforced-concrete grandstands with cantilever balconies, for War Memorial stadium for Univ. of Nebraska, at Lincoln, Neb.

New Grandstand of Race Course at Bois de Vincennes, Near Paris (Les nouvelles tribunes du champ de courses du Bois de Vincennes, près Paris), Ch. Dantin. Génie Civil, vol. 85, no. 25, Dec. 20, 1924, pp. 565-567, 4 figs. Details of design and reinforced-concrete work for stand seating about 1500.

Placing Concrete in Grandstands and Stadia. Concrete, vol. 24, no. 4, Apr. 1924, pp. 159-163, 2 figs. Items for specifications with cost data.

Loading Tests. A Study of Loading Tests on Reinforced Concrete Structures, E. S. Andrews. Concrete & Constructional Eng., vol. 19, nos. 6 and 7, June and July 1924, pp. 369-375 and 443-449, 6 figs. Considers some of more prominent tests made by experimental engineers and studies their principal results in light of ordinary methods of design, explaining how results may be interpreted. June: A two-way hollow-tile floor. July: British tests on one-way hollow tile floors

Marine Shelters. Ferro-Concrete Marine Shelter, J. C. Pardoe. Ferro-Concrete, vol. 16, no. 1, July 1924, pp. 2-7, 4 figs. At Barry Island, an English sea resort; covers area of 200 ft. by 75 ft. and is 24 ft. high; is of Mouchel-Hennebique ferro-concrete throughout.

Mines. Recent Reinforced Concrete Construction Work for Conveying and Working Coal (Neuere Ausführungen in Eisenbeton für Kohlenförderung und -verarbeitung), F. Baumstark. Bauingenieur, vol. 5, no. 17, Sept. 15, 1924, pp. 527-538, 14 figs. Discusses construction work underground, increased elasticity of reinforced-concrete construction, towers for coking coal, safety structures against subsidence in mining districts, etc.

Office-Building Substructures. Construction Methods and Plant for Substructure of Barclay-Vesey Building, New York, F. W. Skinner. Concrete, vol. 25, no. 1, July 1924, pp. 19-22, 4 figs. Barclay-Vesey St. office building being constructed for New York Telephone Co. will have height of 434 ft. above curb and will extend 4 stories or 63 ft. below curb to lowest of its 33 floors; all four sides of lot are completely enclosed by 22 long, narrow, pneumatic caissons of reinforced concrete, like row of bricks on edge, separately sunk end to end and afterward connected by watertight joints to make continuous foundation wall extending down into solid rock.

Precast. Pre-Cast Concrete Used in Engine Terminal. Ry Age, vol. 77, no. 23, Dec. 6, 1924, pp. 1025-1027, 6 figs. Western Pacific builds

two structures of this type of construction at Stockton, Cal.

Railway Structures. Crack and Rust Formations in Reinforced-Concrete Railway Structures (Riss- und Rostbildungen bei Eisenbetonbauten der Eisenbahn), W. Petry. Bauingenieur, vol. 5, nos. 7 and 8, Apr. 15 and 30, 1924, pp. 167-171 and 229-233, 5 figs. Investigations of their causes and means of preventing them. Decree of German State Traffic Minister, Oct. 10, 1922.

Reinforcement Embedment. Should Reinforcement Embedment Vary with Size of Bar? A. S. Woodle, Jr. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1092-1093, 1 fig. Examination into stresses set up by temperature changes in surface areas of reinforced concrete.

Reinforcing Bars. Comparative Tests of New Billet Steel and Rerolled Steel Reinforcing Bars, J. B. Kommers. Univ. of Wis., Eng. Experiment Station—Bul., vol. 9, no. 3, 1924, 32 pp., 6 figs. Details of tests and results obtained.

Slabs. Calculation of Reinforced-Concrete Slabs (Nota sobre el cálculo de forjados de hormigón armado), F. F. Alverez. Revista de Obras Públicas, vol. 72, no. 2418, Dec. 1, 1924, pp. 420-422, 2 figs. Details of simple method for calculating slabs fixed at both ends and under uniform load.

Deformations and Stresses of Continuous Plates (Die Formänderungen und die Spannungen von durchlaufenden Platten), A. Nádai. Bauingenieur, vol. 5, no. 5, Mar. 15, 1924, pp. 102-107, 5 figs. Calculation of deformation and stress in slabs which have individual loads at regularly arranged points.

Graphic Determination of the Neutral Axis of Reinforced-Concrete Slabs Under Simple Bending Load (Détermination graphique de l'axe neutre des dalles en béton armé sollicitées à la flexion simple), R. de Diesbach. Annales de l'Energie, vol. 4, nos. 3 and 4, May-June and July-Aug. 1924, pp. 81-85 and 127-130, 5 figs. Discusses slabs of rectangular cross section and describes simple method of calculation by E. Heirmann. Examples of application.

Reinforced-Concrete Slabs (Dalles en béton armé), A. Volet. Bulletin Technique de la Suisse Romande, vol. 50, no. 14, July 5, 1924, pp. 173-176, 3 figs. Explains use of charts giving cross sections of steel and concrete for simple determination, taking into consideration weight of slabs.

Reinforced-Concrete Slabs Under Simple Flexure (Etude de l'économie des pièces simplement fléchies en béton armé), F. Campus. Revue Universelle des Mines, vol. 4, nos. 5 and 6, Dec. 1 and 15, 1924, pp. 242-261 and 315-339, 9 figs. Discusses most economic dimensions that will also satisfy conditions of security; develops formulas and makes calculations, including simple flexure of rectangular slabs, girders, slab covering, most economic profiles, etc.; examples of application.

Simplified Calculation of Flexible Slabs (Die vereinfachte Berechnung biegsamer Platten), H. Markus. Bauingenieur, vol. 5, nos. 20 and 21, Oct. 25 and Nov. 10, 1924, pp. 660-666 and 702-711, 20 figs. Discusses calculation of ceilings, reinforcement, etc. Describes new method of approximation and gives examples to show its accuracy. Deals with slabs supported on 1, 2 or 3 sides and fixed on 3, 2 and 1, continuous slabs, etc.

Stairway Steps. Calculation of Reinforced-Concrete Stairway Steps (Berechnung eisenbewehrter Betonwerksteinstufen), H. Friesecke. Tonindustrie-Zeitung, vol. 48, no. 33, Apr. 23, 1924, pp. 344-346, 7 figs., partly on pp. 347 and 348. Occurring stresses are computed for different methods of support of steps and for different incline of stairs. Diagrams for solution of problems, involving use of such steps.

Stress Calculation. Shortcuts for Solving Problems in Concrete Design, R. P. V. Marquardsen. Eng. & Contracting (Buildings), vol. 61, no. 2, Feb. 27, 1924, pp. 440-446, 7 figs. Presents shortcut for investigating an existing structure of rectangular cross-section subject to combined axial and bending stress; i.e., a method by which, given cross-section of structure and magnitude and position of resultant of all outside forces acting on section, existing unit stresses in concrete and steel reinforcement may be found readily.

Tanks. See TANKS, Reinforced-Concrete.

Warehouse. Warehouse of a Shipping Firm in Düsseldorf, Germany (Lagerhaus der Speditionsfirma Hugo Daniels G.m.b.H. u. Co., Düsseldorf), F. Lange and J. Strub. Beton u. Eisen, vol. 23, no. 5, Mar. 5, 1924, pp. 50-51, 4 figs. Construction details of 4-story building whose supporting parts are built entirely of reinforced concrete, with flat-slab foundation construction.

Winter Construction. Reminiscences of Winter Construction in British Columbia, A. M. Bouillon. Eng. News-Rec., vol. 93, no. 26, Dec. 25, 1924, pp. 1030-1032, 6 figs. Many bridge piers and other concrete structures on Grand Truck Pac. Ry. constructed in sub-zero weather, often at reduced cost.

Wood-Alcohol Plant. Wood Alcohol Works in Reinforced Concrete of the Trickzellstoff Co. in Kehl (Der Neubau eines Spritwerks in Eisenbeton der Trickzellstoff G.m.b.H. in Kehl a. Rh.), R. Eisenlohr. Beton u. Eisen, vol. 23, no. 14, July 20, 1924, pp. 181-182, 5 figs. Wood alcohol is produced from cellulose waste lye by fermentation and subsequent distillation; design and construction of buildings.

CONCRETE MIXERS

Gravity. Gravity Material Supply Cuts Handling Costs. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 420-422, 4 figs. Describes concrete mixing plant employed for track elevation work on Pennsylvania R. R. at Cleveland, Ohio. Located, of necessity, in a restricted place, it required special layout. It is a one-yard mixing plant and delivers 400 cu. yd. in a 10-hr. day.

Standards for. Concrete Mixer Standards Are Revised. Concrete Rec. & Eng. Rev., vol. 38, no. 24, June 11, 1924, pp. 606-608. Regulations adopted at a joint meeting of representatives of concrete mixer manufacturers and Associated General Contractors of America.

CONCRETE, REINFORCED

Alignment Charts for. See ALIGNMENT CHARTS, Reinforced Concrete.

Beams. See BEAMS, Reinforced-Concrete.

Stresses in Circular Members. Determination of Bending and Shearing Stresses in Circular Reinforced Concrete Members, B. Wallach. Commonwealth Engr., vol. 12, no. 3, Oct. 1, 1924, pp. 89-93, 3 figs. Determination of stresses due to bending and shear in both hollow and solid circular sections when combined direct and bending stresses produce tension in section, exceeding allowable tensile stress in concrete.

CONCRETING

Cold-Weather. Building Concrete Structures in Winter. Can. Engr., vol. 46, no. 4, Jan. 22, 1924, pp. 169-172, 12 figs. Fundamentals of cold-weather concreting; describes methods employed, including heating materials, protection while hardening, protective coverings for concrete, etc. From Bul. of Portland Cement Assn.

Concreting in Freezing Weather, E. F. Rockwood. Architectural Forum, vol. 40, no. 1, Jan. 1924, pp. 41-42, 1 fig. Effects of cold weather

on concrete and suggestions for concreting in cold weather.

Practical Rules for Concreting in Cold Weather. Contract Rec., vol. 38, no. 47, Nov. 19, 1924, pp. 1141-1146, 12 figs. Principle is to supply enough heat and moisture to keep chemical action progressing. Practical rules for cold weather work. Use of tarpaulins.

Report on Placing Concrete in Winter. Ry. Rev., vol. 75, no. 17, Oct. 25, 1924, pp. 625-629. Feasibility, economy, and desirability of winter concrete work and approved methods of such construction. (Abstract.) Report of committee before Am. Ry. Bridge & Bldg. Assn.

The Economy of Winter Concrete Work. Contractors' & Engrs. Monthly, vol. 7, no. 6, Dec. 1923, pp. 53-55. Much time saved, but great caution must be taken in winter building with concrete. Proper procedure.

See also HYDROELECTRIC PLANTS, Winter Reconstruction.

Towers for. See CONVEYORS, Building-Construction.

CONDENSERS, AMMONIA. See AMMONIA CONDENSERS.

CONDENSERS, ELECTRIC

Capacities. Note on the Capacities of Small Air Condensers, L. Hartshorn. Jl. Sci. Instruments, vol. 1, no. 10, July 1924, pp. 305-309, 3 figs. Considers most general case of a condenser, i.e., any two conductors in a dielectric medium. Also considers case of a condenser carrying alternating current; points out desirability of making effective capacity depend on geometry of system and nature of dielectric only, and deduces conditions necessary; importance of these considerations in case of shielded air condensers.

Defects. The Imperfections of Condensers (Les imperfections des condensateurs), J. Granier. Revue Générale de l'Electricité, vol. 15, no. 4, Jan. 26, 1924, pp. 125-132, 3 figs. General study of poor insulating materials for direct and alternating current; discusses methods employed for determination of losses or of viscosity; attributes viscosity to electrolytic impurities, and gives physical interpretation of mathematical laws which are based on experience.

Grid-Leak Circuit. An Investigation of the Grid Leak Circuit, N. Wells. Elec. Rev., vol. 95, no. 2451, Nov. 14, 1924, pp. 751-752, 2 figs. Describes internal working of grid-leak circuit and shows fallacy of considering resistance simply as leak to condenser.

Insulating Materials and. Insulating Materials and Condensers (Isolants et condensateurs), J. Lahousse. Revue Générale de l'Electricité, vol. 15, nos. 15 and 16, Apr. 12 and 19, 1924, pp. 621-627 and 667-674, 4 figs. Review of results obtained by investigators of dielectrics, which are used to develop diagram of an insulating material; study of how to carry out calculation of condenser, with given power factor of insulating material in function of temperature.

Oscillations, Overdamped. Overdamped Condenser Oscillations, Chas. P. Steinmetz. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 424-428, 9 figs. Shows effect of condenser leakage on discharge wave.

Power Loss with Liquid Dielectrics. The Power Loss in Condensers with Liquid Dielectrics, L. S. McDowell. Physical Rev., vol. 23, no. 4, Apr. 1924, pp. 507-517, 5 figs. Power loss in condensers with liquid dielectrics; variation of equivalent series resistance and capacity with frequency, 600 to 3500 cycles.

Radiotelegraphic. Condensers in Radiotelegraphy (Les condensateurs en T. S. F.). Electricien, vol. 55, no. 1357, Oct. 1, 1924, pp. 439-442, 6 figs. Calculation; series and parallel grouping; testing by ballistic and by Kelvin methods.

Static. Recent Advances in the Design, Manufacturing and Testing of Static Condensers in Power Sizes, R. E. Marbury. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 114-118, 10 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1180-1186, 3 figs. Describes static condensers designed with insulation factors of safety such as have proved dependable in other apparatus for years.

Static Condensers in Series with the Stator Winding of Squirrel-Cage Induction Motors, T. F. Wall. World Power, vol. 1, no. 2, Feb. 1924, pp. 100-105, 10 figs. Study of effects of introducing static condensers in series with stator winding of squirrel-cage induction motor.

The Use of Static Condensers in Series with Stator Windings of Squirrel-Cage Induction Motors (L'emploi des condensateurs statiques en série avec les enroulements statoriques des moteurs d'induction à cage d'écureuil). Industrie Electrique, vol. 33, no. 765, May 10, 1924, pp. 169-173, 9 figs. Notes on improvement of power factor.

Static vs. Synchronous. Selection of Corrective Equipment, M. A. Hyde. Elec World, vol. 83, no. 10, Mar. 8, 1924, pp. 472-474, 4 figs. Choosing static or synchronous condensers on economic basis; comparisons as to cost, weight, volume, and operation; graphical solutions to corrective problem.

CONDENSERS, STEAM

Air Cooling, Effect on. How External Air Cooling Increases the Effectiveness of Condenser-Tube Surface, P. Bancel. Power, vol. 59, no. 20, May 13, 1924, pp. 769-771, 4 figs. Points out that two distinct processes ordinarily occur inside of surface condensers, namely, steam condensing, which goes on at high rate of heat transfer, and devaporizing air-steam mixture, which is carried out at very low rate of heat transfer; when air coolers are provided outside of condenser to handle latter process, condenser tubes may operate at much higher efficiency.

Air Pumps for. See AIR PUMPS, Water vs. Steam-Jet.

Auxiliaries. Some Condenser Auxiliaries. Power Engr., vol. 19, no. 224, Nov. 1924, pp. 424-426, 4 figs. Describes developments of apparatus for modern conditions.

Barometric, Testing. Testing Steam Turbine and Barometric Condenser, F. S. Youtsey. Power, vol. 59, no. 25, June 17, 1924, pp. 979-980, 2 figs. Method employed in testing condenser serving mixed-pressure steam turbo-generator.

Barometric, Vacuum-Pump Capacity. Calculating the Amount of Air Liberated in Barometric Condensers, C. M. Reed. Power, vol. 59, no. 10, Mar. 4, 1924, pp. 370-372, 4 figs. Air enters with cooling water, steam and by leakage, which may be easily calculated from charts.

Condensate, Reuse of. Practical Experience in the Field of Returning the Water of Condensation (Praktische Erfahrungen auf dem Gebiete der Kondensatrückführung), R. Schulze. Wärme, vol. 47, no. 21, May 23, 1924, pp. 235-239, 7 figs. Discusses importance of feeding back condensate, faulty construction, advantage of collecting condensate under pressure, automatic condensate return.

Defects. Condenser Troubles. Mar. Engr. & Nav. Architect, vol. 47, no. 556, Jan. 1924, pp. 31-32, 4 figs. Consideration of defects common in condensers, and effect of application of metallic packing.

CONDENSERS, STEAM

Design. The Principles of Condenser Design, D. G. McNair. Power Engr., vol. 19, no. 221, Aug. 1924, pp. 304-307, 2 figs. General survey of three main types, showing how their leading dimensions may be roughly determined.

See also Surface.

Ejector-Air. Ejector-Air Condenser (L'Ejecteur-Air Condenseur), Génie Civil, vol. 84, no. 10, Mar. 8, 1924, pp. 234-235, 6 figs. Describes apparatus and principle upon which it is based; output depends solely upon speed of steam transmission in appartus, and is expressed in function of ratio of weight of steam to cross-section of ejector inlet.

Evaporative. The Evaporative Condenser, N. E. Webster. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 192-198, 3 figs. Description of conditions for which this type of condenser seems peculiarly suitable.

Isolated Plants. Condensing Equipment for Isolated Plants, C. L. Hubbard. Nat. Engr., vol. 28, no. 4, Apr. 1924, pp. 161-162. Applications of condensers in isolated plants; types of condensers suitable for this service and calculations involved in determining capacity and water requirements.

Jet. Jet Condenser Performance, Geo. E. Gaster. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1089-1092, 3 figs. Detailed discussion of various factors affecting operation.

Operation. Condensing Equipment. Nat. Elec. Light Assn., Serial Report of Prime Movers Committee, Sept. 1924, 60 pp., 76 figs. Operating results with jet condensers of different sizes, giving tests with various arrangements; analysis to show effect of varying amount of injection water; and suggested methods for determining economical quantities. Spray pond design and operation; surface condenser operation; air pumps; improvements in condensing performance effected by Laning; detection of condenser leakage; effect of heat transfer of various methods of cleaning condenser tubes; etc. Manufacturers' statements. Bibliography.

See also Surface.

Performance of, Checking. Condenser Performance, J. Bruce. Elec. Rev., vol. 94, no. 2410, Feb. 1, 1924, pp. 164-166, 6 figs. Describes simple and easily applicable methods for checking condenser performance of generating set in few moments, and also system whereby continuous tabulated and graphical record of such performance can be recorded from day to day, showing behavior of plant at glance.

Pumps, Cooling-Water. Economical Operation of Condenser Pumps, Chas. E. Colborn. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 643-645, 4 figs. Study of conditions governing use of one or two circulating pumps with changes in cooling-water temperatures.

Single- vs. Double-Pass. Single-Pass Condensers Require Less Pumping Power Than Double-Pass, P. Bancel. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 371-372, 2 figs. Neglecting external head, a single-pass condenser requires about one-eighth pumping power for same amount of cooling water as with a double-pass unit. Discusses resistance of external piping and rearrangement of condenser design, so as to utilize single flow to best advantage.

Steam-Turbine. See STEAM TURBINES, Design.

Surface. A New Type of Surface Condensers (Eine neue Bauart von Oberflächenkondensatoren), L. Heuser. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 43, Oct. 25, 1924, pp. 1121-1124, 5 figs. Discusses deleterious influence of condensate and air on cooling effect, and describes new design known as Ginabat condenser which avoids these difficulties; experimental results prove efficiency of new design.

A Very Large Condenser. Engineer, vol 137, no. 3552, Jan. 25, 1924, pp. 100-101, 6 figs. Condenser is one of two to be used in connection with two 30,000-kw. turbo-generator units being installed in large hydraulic-power station; is of contraflo type, 19 ft. 5 in. long between tube plates, and has internal diam. of 13 ft.

Efficient Operation of Surface Condensing Plant. Elec. Times, vol. 65, no. 1685, Jan. 31, 1924, pp. 117-119, 1 fig. Suggestions in regard to efficient operation; chart for determination of partial pressure of air under varying conditions of vapor temperature and absolute pressure.

Proportioning Water-Works Surface Condensers, W. R. Freeman. Power, vol. 60, no. 14, Sept. 30, 1924, pp. 529-531, 3 figs. Formulas and curves that may be used to advantage in proportioning of water-works condenser with typical examples to demonstrate their use.

Steam Used by Surface Condenser Auxiliaries, J .D. Morgan. Power Plant Eng., vol. 28, no. 22, Nov. 15, 1924, pp. 1135-1136, 3 figs. Higher vacuum is accompanied by greater power demand for driving auxiliaries; auxiliary steam consumption of surface-condensing plants.

Surface Condenser Operation, C. S. Tomlinson. Elec. Light & Power, vol. 2, no. 3, Mar. 1914, pp. 13-14, 60 and 62, 2 figs. Gives two formulas which can be used in studying condenser operation and shows how to apply them.

Surface Condensers (Note sur les condenseurs par surface). Bul. Technique du Bureau Veritas, vol. 6, no. 7, July 1924, pp. 131-133, 5 figs. Details of an improved surface condenser and tests carried out showing saving of steam of 4.5 per cent.

Surface Condensers and Auxiliaries, J. P. Likiak. So. Engr., vol. 41, no. 5, July 1924, pp. 51-55, 11 figs. Size limit, arrangement of passes, method of tube packing, and methods of cleaning tubes.

Surface Condensing Plant Operation. Power Engr., vol. 19, no. 225, Dec. 1924, p. 465. Method of analyzing operation of surface condensers.

Tendencies in Surface Condenser Practice. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 530-533, 4 figs. Points out that elimination of dead tube space, multiple air-suction openings, and variable water supply are important factors in condenser design and application.

Transmission of Heat in Surface Condensers According to Nusselt's Theory (La trasmissione del calore nei condensatori a superficie secondo la teoria del Nusselt), M. Medici. Industria, vol. 38, nos. 2, 4, and 6, Jan. 31, Feb. 29, and Mar. 31, 1924, pp. 40-43, 100-103, and 163-165, 4 figs. Extended mathematical treatment of subject.

Test Code. Test Code for Condensing Apparatus. Mech. Eng., vol. 46, no. 5, May 1924, pp. 291-296. Preliminary draft of additional code in series of nineteen being formulated by A. S. M. E. Committee on Power Test Codes.

Tubes. Chlorine Keeps Condenser Tubes Clean, C. H. S. Tupholme. Power Plant Eng., vol. 28, no. 20, Oct. 15, 1924, p. 1055, 1 fig. Process and apparatus, known as Chloronome, for continuous and automatic treatment of cooling water with measured trace of chlorine gas to prevent fouling of condenser tubes and other cooling surfaces with deposits of living organisms.

Condenser Tubes Pulled in Record Time. Power, vol. 59, no. 26, June 24, 1924, pp. 1032-1033, 5 figs. Special devices facilitate removal of 6000

plugs and 9000 tubes from large surface condenser.

Corrosion of Condenser Tubes, Johnstone Taylor. Mar. Eng. & Shipg. Age, vol. 29, no. 2, Feb. 1924, pp. 108-109. Recent investigations prove entrapped air to be cause of raid corrosion.

Manufacture of Condenser Tubes, W. R. Webster. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 871-872. How non-ferrous castings of hollow cylinders are transformed into tubes. Composition and heat treatment. Abstract of paper read before Metropolitan Sec. of A. S. M. E.

The Metallography and Properties of Condenser Tubing, C. Blazey. Commonwealth Engr., vol. 11, no. 12, July 1, 1924, pp. 461-469, 20 figs. Discusses metallography, mechanical and other properties, and general considerations.

See also Surface.

Tubes, Packing for. Condenser-Tube Packing. Steamship, vol. 36, no. 423, Sept. 1924, pp. 88-91, 10 figs. Shows underlying causes and points out way to satisfactory and economical solution of problem; discusses condenser-tube disintegration, deformation, damage, life of condenser packing, and condenser ferrules.

Types. The Control of Power Production, Chas. L. Hubbard. Factory, vol. 32, no. 3, Mar. 1924, pp. 312-316 and 366, 19 figs. Condensers and condenser equipment.

Unit Heat-Transfer Determination. Condenser Unit Heat Transfer Obtained from Chart, H. O. Michael. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 488-489, 1 fig. Gives chart with which operating engineer may very quickly learn condition of condenser, and explains its use. Based on general principle that all central stations and other well-regulated plants maintain a fairly constant steam pressure and temperature; because of this, B.t.u. rejected to condensers per lb. of steam is nearly constant, varying slightly with vacuum.

Vacuum. Methods Employed for Holding the Vacuum in Condensers in Marine Steam Engines (Note sui mezzi impiegati per mantenere il vuoto nei condensatori nelle macchine a vapore marine). Rivista Marittima, vol. 57, no. 10, Oct. 1924, pp. 35-53, 7 figs. Discusses theory of condensers and practical application of air ejectors, with recent examples.

Stoppages and Defects in Condensing Plants (Störungen und Mängel an Kondensationsanlagen). Hanomag-Nachrichten, vol. 11, no. 129-130, July-Aug. 1924, pp. 121-125, 2 figs. Discusses maintenance of vacuum, and causes leading to trouble; importance of condensing plant in steam-engine operation.

CONDUITS

Backwater and Drop-Down Curves. New Method of Computing Backwater and Drop-Down Curves, A. G. Husted. Eng. News-Rec., vol. 92, no. 17, Apr. 24, 1924, pp. 719-722, 4 figs. Modification of channel subdivision method with elimination of trial calculations; applicable to canals, sewers, etc., under uniform hydraulic conditions.

Concrete. Concrete Conduit Gaining Favor. Cement & Eng. News, vol. 36, no. 7, July 1924, pp. 33-34 and 40, 4 figs. Electrical engineers find "stone" product has many advantages over other materials in underground wiring systems.

Concrete Drain in Creek Bed. Richmond (Va.) Puts Shockoe Creek into a Concrete Conduit, A. J. Saville. Eng. News-Rec., vol. 93, no 23, Dec. 4, 1924, pp. 900-902, 4 figs. Methods and costs of constructing concrete drain in bed of creek carrying water and contracted by bridges.

Economic Design. A Method for the Economic Design of Penstocks, H. L. Doolittle. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 785-792, 13 figs. Presents original, simple graphic method for economic design; given certain flow of water, length of piping, and profile of penstock, curves can be rapidly drawn for pipes of varying diameter which indicate frictional loss and its value in dollars. Paper is accompanied by discussion, by R. L. Daugherty, in which algebraic solution of problem is presented.

Electrical, Concrete-Pipe. Concrete Pipe Electrical Conduits. Concrete, vol. 25, no. 1, July 1924, pp. 32-34, 4 figs. Method of installation, essential qualities of duct material, comparison of various materials, advantages of using concrete conduit, and extensive use of concrete conduit.

Hetch Hetchy Project, San Francisco. Building Moccasin Creek Penstock, Hetch Hetchy Project. Eng. News-Rec., vol. 93, no. 22, Nov. 27, 1924, pp. 858-860, 6 figs. Joints in welded pipe 15/16 in. thick "laid up" to clearances under 0.007 in. before riveting is done; derrick for placing pipe sections slides up on pipe already laid.

Installation. Underground Construction, T. C. Ruhling. Serial article in Elec. Light & Power, vol. 2, beginning Feb. and ending Dec. 1924, 80 figs. Practical treatise on methods and costs of typical underground conduit installations.

Medieval Construction. The "Chimney" or "Devil's" Conduit of the Grey Friars Monastery. Engineer, vol. 138, no. 3598, Dec. 12, 1924, pp. 658-660, 8 figs. Notes on old conduits in Bloomsbury and Pentonville and illustrations and descriptions of medieval conduits and reservoir, built in 13th century.

New York City Pipe Lines. Additional City Pipe Conduits of the Catskill Aqueduct, W. E. Spear. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, pp. 838-841, 6 figs. Large steel pipe lines on land in Brooklyn, Queens, and Richmond boroughs and cast-iron submarine pipe line beneath narrows of New York harbor; design, coating, and construction.

Penstocks. Penstock Manifolds Designed to Simplify Stresses, H. L. Doolittle and C. W. Larner. Eng. News-Rec., vol. 92, no. 24, June 12, 1924, pp. 1006-1008, 7 figs. Describes unusual penstock manifolds of radically different types installed at two of new power plants, one at Big Creek, no. 3 plant of S. Cal. Edison Co., and other in Vermont at Davis Bridge plant of N. E. Power Co.; both designed to eliminate as many indeterminate stresses as possible.

See also Economic Design; Pressure.

Pressure. Gallery of the Teigitsch Power Plant (Der Stollen des Teigitschkraftwerkes), J. Ornig. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 45-46, Nov. 14, 1924, pp. 385-391, 9 figs. Details of construction work on a pressure conduit 5357 m. in length. Geology, profile, triangulation, method of driving gallery, concreting and lining, and tests on sections and results.

Pressure-Conduit Tests of the Swiss Federal Railway (Kurzer Bericht über die Druckstollen-Versuche der S. B. B.), A. Schrafl. Schweizerische Bauzeitung, vol. 83, nos. 1 and 3, Jan. 5 and 19, 1924, pp. 7-10 and 27-30, 11 figs. Account of work of investigation to determine causes of failure of Ritom tunnel and expert testimony on other tunnels of Swiss Federal Ry.

Recent Examples of Reinforced-Concrete Pressure Conduits for Hydroelectric Plants (Neuere Ausführungen von Eisenbetondruckrohrleitungen für Wasserkraftanlagen), K. Bechtel. Bauingenieur, vol. 5, no. 7, Apr. 15, 1924, pp. 199-206, 18 figs. Describes installations made by German firm.

The Pipe Lines of the Moncenisio Hydro-electric Plant, S. L. R. Hollis. Engineer, vol. 137, no. 3573, June 20, 1924, pp. 692-694, 6 figs. Survey with regard to certain essential factors concerning pipe lines of Italian hydroelectric plant which operates under highest heat developed upon extensive scale in world; details of exacting and novel nature of official tests demanded by Italian Government in connection with plant.

CONNECTING RODS

Automobile Engine, Machining. See AUTOMOBILE ENGINES, Machining Parts.

Locomotive, Repair of. Repairing Locomotive Main and Side Rods, Chas. F. Henry. Am. Mach., vol. 60, no. 20, May 15, 1924, pp. 731-732, 10 figs. Detailed information concerning methods in use on Santa Fé system for reclaiming broken and worn connecting rods to fit them for further service.

Machining. Hollow Connecting Rods in the Making, F. H. Colvin. Am. Mach., vol. 60, nos. 9 and 10, Feb. 28 and Mar. 6, 1924, pp. 311-313 and 351-352, 16 figs. Feb. 28: Operations on connecting rods for Wright airplane engines; fixtures and methods for securing light weight, accuracy and ample strength. Mar. 6: Construction of inner rod and methods by which it is machined.

Milling Automobile Truck Connecting-rods, Chas. O. Herb. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 276-278, 6 figs. Complete tooling for milling operations on connecting rods for Mack trucks, designed and made by Cincinnati Milling Machine Co.

Roller Bearings for. See BEARINGS, ROLLER, Connecting Rods.

CONSTRUCTION WORK

Day-Labor Construction. Day Labor Construction Does Not Pay, A. S. Bent. Am. Contractor, vol. 45, no. 4, Jan. 26, 1924, pp. 25-27. See also Contract Rec. & Eng. Rev., vol. 38, no. 11, Mar. 12, 1924, pp. 264-267. Tells what is behind the day labor tendency, where method fails, and why it fails; lists a number of typical instances in which costs of construction by this means far exceed contractors' bids.

Economic Aspects of Day Labor Construction, A. S. Bent. Mun. & County Eng., vol. 66, no. 2, Feb. 1924, pp. 71-77. Gives examples of day labor construction.

Force-Account Construction. Force Account and Winter Work on Small City Jobs, I. E. Houk. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 292-293. Experience in building public works by force account at Dayton, Ohio, has shown that method is often, but not always, advisable.

Machinery for. What is New in Construction Equipment? Contract Rec. & Eng. Rev., vol. 38, nos. 1, 2, and 3, Jan. 2, 9, and 16, 1924, pp. 14-18, 35-39, and 57-63, 37 figs. Developments in 1923 in labor-saving machinery for contractor, including excavating machinery, ditching and trenching machinery, concrete mixing and placing equipment, material-handling equipment, haulage equipment, compressed-air equipment, crushing machinery, pile-driving machinery, lighting by acetylene flares and road-building machinery.

Pneumatic Equipment, Applications of. How Pneumatic Equipment Speeds Up Winter Construction Work, F. A. McLean. Contract Rec. & Eng. Rev., vol. 38, no. 5, Jan. 30, 1924, pp. 113-118, 11 figs. The application of pneumatic equipment for work such as trenching and excavation, bridge building, etc.

CONTINOSTAT. See STRUCTURES, Statically Indeterminate.

CONTRACT WORK

Estimating. Estimating Contract Work, D. S. Cole. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 373-376, 1 fig. Outlines method which simplifies estimating and makes easier executive's work of keeping his plant profitably busy.

CONTRACTING

Municipal. Drawing, Advertising and Letting Municipal Contracts, J. N. Ambler. Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924, pp. 906-909. Comparison of lump-sum and other types of bids; call for bids, letting of contracts, and reflections on good and bad engineering.

Time Charge. Time Charge Replaces Bonus and Penalty Clauses, H. H. Quimby. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 989-990. Operated successfully in over a hundred contracts; approved by city law department and liked by contractors.

CONTRACTORS' MACHINERY. See CONSTRUCTION WORK, Machinery for.

CONTROLOGRAPH. See AUTOMOBILES, Speed and Movement Recorder.

CONVERTERS

Cascade. A New Cascade Converter (Di un nuovo convertitore in cascata), S. Rotolo. Elettricista, vol. 3, no. 14 (series 4), July 15, 1924, pp. 105-106, 1 fig. Discusses new type in which half current is supplied by circuit outside of motor and other half by dynamo.

Operation. Operation of Converting Apparatus, V. E. Johnson. Power Plant Eng., vol. 28, nos. 16, 18, 20, 22, and 24, Aug. 15, Sept. 15, Oct. 15, Nov. 15, and Dec. 15, 1924, pp. 855-857, 952-954, 1059-1061, 1148-1151, and 1255-1257, 27 figs. Preliminary considerations; methods of converting alternating to direct current; motor-generators; rotary converters; methods of connecting; voltage regulation; operation of rotary converters; effects of power factor; parallel operation of rotaries; obtaining load division; protective features; maintenance of rotary converters; sparking and flashovers.

Rotary. Pressure Regulation of Rotary Converters by Means of Choke Coils, O. Thaning. Brown Boveri Rev., vol. 11, nos. 10 and 12, Oct. and Dec. 1924, pp. 220-229 and 282-290, 25 figs. All data required in connection with pressure regulation of rotary converters by means of choke coils are worked out and expressed as formulas which can be easily used in practice; indicates how results so obtained can be employed in designing choke coil; describes graphical method by which these results can be more rapidly determined; examples of application of formulas and of graphical method, and also of use of practical diagram for this purpose.

Rotary Converters, C. E. Bisdee. Elec. Engr., vol. 1, nos. 7 and 8, Oct. 15 and Nov. 15, 1924, pp. 241-248 and 293-298, 10 figs. Notes on voltage limitations and variation. Starting methods; telephonic disturbances; flashing.

The Generating Effect in Rotary Converters on Short Circuit, F. Hoeberli. Brown Boveri Rev., vol. 11, no. 1, Jan. 1924, pp. 3-12, 12 figs. Details of short-circuit tests carried out on series of rotary converters for direct-current traction service at 1600 volts, new type of quick-acting circuit breaker being employed.

See also Operation.

CONVEYORS

[See also MATERIALS HANDLING, Apparatus; Equipment; Stone and Clay Industries.]

Ash-Handling. See COAL HANDLING, Conveyors.

Automobile Factory. Conveying Sub-Assemblies in the Oakland Plant, H. Campbell. Am. Mach., vol. 60, no. 23, June 5, 1924, pp. 831-833, 8 figs. Conveyors forming part of material-handling equipment of Oakland Motor Car Co., Pontiac, Mich.; conveying motors and axles by overhead conveyor.

Power Conveyors in the Automobile Plant. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 541-543, 4 figs. Describes several examples of modern conveyor installations, link chains and sprockets for which were supplied by Link-Belt Co., Chicago.

The Modern Plant as a Production Machine, E. H. Nenning. Am. Mach., vol. 61, no. 7, Aug. 14, 1924, pp. 273-276, 12 figs. Use of conveyors in production of Oldsmobiles; relation of plant layout to production; construction of conveyors equipped with speed reducers and transmissions.

See also AUTOMOBILE MANUFACTURING PLANTS, Materials Handling in.

Belt. See COAL HANDLING, Conveyors.

Belting for. See BELTING, Lumber Industry.

Bridge. Conveying Bridges for Open Works in German Patents (Die in den deutschen Patenten zutage getretenen Bestrebungen in der Entwicklung der Abraum-Förderbrücken), Walther Fördertechnik u. Frachtverkehr, vol. 17, no. 23, Dec. 3, 1924, pp. 324-327, 11 figs. Design, construction, and operation of conveyor bridges as used in lignite-stripping operations.

Building-Construction. Quantity Conveying in Building Construction and Mining (Massenbeförderung bei Hoch- und Tiefbauten), G. Garbotz. Deutsche Bauzeitung, vol. 58, no. 70, Aug. 30, 1924, pp. 137-141, 12 figs. Types of apparatus for conveying building material, including cranes, gravity concrete towers, cement spraying, etc.

Cable. Handling Materials by Cable Conveyor, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 68, no. 3, Sept. 1924, pp. 170-177, 11 figs. Describes installations which use cables as power and carrying medium. Examples of European practice.

Chewing-Gum Plant. Conveyors Handle Chewing Gum, W. B. Raney. Mgmt. & Administration, vol. 8, no. 4, Oct. 1924, pp. 387-390, 10 figs. System in William Wrigley Jr. Co., Chicago plant.

Coal-Handling. See COAL HANDLING, Conveyors.

Coal-Mine. See COAL MINES, Conveyors.

Continuous. Modern Large-Scale Conveying by Means of Continuous Conveyors (Neuzeitlicher Massentransport mit Dauerförderern), M. Buhle. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 30, July 26, 1924, pp. 777-781, 15 figs. Describes lignite-conveying plants, at Klukwitz mine, briquet-conveyor plant at Voss mine, and coking-coal conveyor plant at Werme mine built by Bleichert & Co.

Continuous vs. Intermittent. Continuous Versus Intermittent Conveyors and Handling Methods, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 3, Feb. 7, 1924, pp. 77-80, 4 figs. General distinguishing features of the two systems; possibility of increasing capacity of an existing conveyor installation; comparison between working costs; continuous and intermittent industrial methods; etc.

Cotton-Mill. A Conveyor System that Revolutionized a Cotton Mill, Robt. T. Kent. Mgmt. & Adminstration, vol. 7, no. 4, Apr. 1924, pp. 411-416, 9 figs. Mechanical handling methods at Jackson Mills at Nashua, N. H.; system is designed to handle entire product from raw cotton to finished cloth with exception of movement between one or two operations, where hand labor is more economical.

Conveyors Require Good Management, Robt. T. Kent. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 539-543. Mechanical handling in cotton bill improved production, increased wages, lowered costs, and lessened labor troubles; methods employed at Jackson Mills at Nashua, N. H.

Factory. Conveyor Plants for Modern Manufacturing Processes, Hauck. Eng. Progress, vol. 5, no. 10, Oct. 1924, pp. 219-223, 16 figs. Describes various types employed by large manufacturing firm, including gravity conveyors, lifts, belt conveyors, etc.

Increasing Production by Power Conveyors, Chas. O. Herb. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 706-709, 5 figs. See also Machy. (Lond.), vol. 24, no. 618, July 31, 1924, pp. 558-561, 5 figs. Conveyor installations that have proved their economy in plant manufacturing small parts; japanning conveyors; conveyors for cleaning work before nickel-plating, and rinsing and drying afterward; assembly conveyors.

Flour-Mill. Conveying Apparatus in Flour Mills, Their Construction, Efficiency and Power Requirements (Die Fördervorrichtungen in Mühlen, deren Konstruktion, Leistungsfähigkeit und Kraftbedarf), F. Baumgarten. Fördertechnik u. Frachtverkehr, vol. 17, no. 11, June 3, 1924, pp. 153-155. Discusses development of conveying in connection with automatic grinding, conveying of flour in bulk and in sacks, ascending and descending conveyors, etc.

Forgings and Scrap Handling. Conveyors to Handle Forgings and Scrap. Iron Age, vol. 113, no. 24, June 12, 1924, pp. 1711-1712, 3 figs. Application of conveyor equipment for handling flashings and small automobile forgings from cold trimming presses at forge plant of Chevrolet Motor Co., Detroit.

Foundry. See FOUNDRIES, Materials-Handling Equipment.

Grain. Modern Technics of Conveying and Storing of Grain in Mill and Granary Construction (Neuzeitliche Förder- und Lagertechnik beim Kornumschlag im Mühlen- und Speicherbau), M. Buhle. Fördertechnik u. Frachtverkehr, vol. 17, nos. 13 and 14, July 8 and 25, 1924, pp. 175-179, and 191-195, 25 figs. Details of construction of various types of store houses, silos, etc., and conveyors from boats and to railway cars, grain and sack conveying. July 25: Examples of modern mill construction with conveying details.

Gravel-Plant. See GRAVEL PLANTS, Field Conveyors.

Mail and Parcel Transport. Mechanical Messengers, R. Heumann. Eng. Progress, vol. 4, no. 12, Dec. 1924, pp. 254-259, 10 figs. Arrangement of pneumatic-tube plant; rope-conveyor plants, employed in business houses and smaller works where correspondence has to be distributed from one central point to different points and recollected; conveyor belts.

Manual. Conditions for Producing Economic Manual Conveyors (Die allgemeinen Bedingungen zur Erzielung wirtschaftlicher Handfördermittel), H. R. Müller. Praktische Maschinen-Konstrukteur, vol. 57, nos. 32 and 33, Aug. 26 and Sept. 2, 1924, pp. 441-444 and 453-455, 20 figs. Design and construction of hand cars and trucks for tracks or trackless, and calculation of comparative costs. Manually-operated overhead conveyors running on rails, and their operation.

Overhead Monorail. Monorails and Their Application (Les monorails et leurs applications). Usine, vol. 33, no. 25, June 21, 1924, pp. 25-29, 8 figs. See also Génie Civil, vol. 85, no. 1, July 5, 1924, pp. 16-18, 3 figs. Describes various telepher systems executed by Establissements Tourtellier, Mulhouse.

See also FREIGHT HANDLING, Monorail Overhead Carrying System.

Pneumatic. Economics of Pneumatic Conveyors for Factories (Wirtschaftlichkeit von Hausrohrpostanlagen), J. Fritz. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 26, June 28, 1924, pp. 681-683, 7 figs. Discusses principal types of conveyor systems for handling papers and small articles within building; operation of suction and pressure air plants.

Experimental Investigation of Pneumatic Conveying Process (Die experimentelle Untersuchung des pneumatischen Fördervorganges), M. Gasterstädt. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 24, June 14, 1924, pp. 617-624, 22 figs. Also Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 265, 1924, 76 pp., 10 figs. Describes experimental plant and measuring arrangements. Effect of quantity conveyed and velocity on pressure drop in conveying system; shows uniform connection between quantity conveyed and drop in pressure, and between velocity of air current and of material.

The Pneumatic Conveying of Materials, M. W. Potts. Indus. Mgmt (N Y), vol. 77, no. 1, Jan. 1924, pp. 9-15, 10 figs. Present state of development; principles involved; special problems encountered.

Pulverized Material. Fuller-Kinyon System of Conveying Pulverized Coal and Other Materials. Indus. Mgmt. (Lond.), vol. 11, no. 4, Feb. 21, 1924, pp. 103-106, 4 figs. Description of system whose outstanding characteristics are simplicity, safety, and cleanliness.

Rope. See Mail and Parcel Transport.

Sectional Portable. Rugged All-Steel Sectional Portable Conveyor Co-ordinates Mining and Haulage. Coal Age, vol. 25, no. 19, May 8, 1924, pp. 669-672, 8 figs. Constructed in short sections each of which can be carried by two men; pins are used instead of bolts as fastening; several motors used when long conveyor is to be driven.

Shaking. Conveying by Shaking Chute and the Acceleration Process by Marcus (Die Schüttelrutschenförderung und das Beschleunigungsverfahren von Marcus), O. Ohnesorge. Fördertechnik u. Frachtverkehr, vol. 17, no. 11, June 3, 1924, pp. 150-153, 5 figs. Discusses deviation of angle, intercallation of inclined planes, curved conveyor paths, etc.

Loosely Coupled Shaking Conveyors (Lose gekoppelte Förderrüttler), E. Asch. Zeit. für technische Physik, vol. 5, no. 10, 1924, pp. 436-441, 5 figs. Details of methods of calculation by means of alignment charts according to laws of oscillation.

Shaking Conveyors and the Marcus Acceleration Process (Die Schüttelrutschenförderung und das Beschleunigungsverfahren von Marcus), O. Ohnesorge. Fördertechnik u. Frachtverkehr, vol. 17, no. 6, Mar. 20, 1924, pp. 71-76, 8 figs. Mechanical basic conditions of oscillating troughs in general and the Marcus trough in particular; shaking-chute conveyance in inclined path purely as gravity conveyance; drive of shaking conveyors.

Shaking Conveyors as a Means of Transport in Mines (Pendelrännor som transportmedel vid gruvor), P. E. Gummeson. Teknisk Tidskrift, vol. 54, no. 6, Feb. 9, 1924, pp. 9-14 (Bergsvetenskap), 14 figs. Examples of simple construction of such channels are shown and economy of their use is pointed out.

Short-Distance. Short-Distance Conveyors (Nahfördermittel). Tonindustrie-Zeitung, vol. 48, no. 76, Sept. 20, 1924, pp. 837-838, 4 figs. Notes on roller platforms for conveying at any angle, used for coal, sand, and other bulk goods, singly or in combination.

Skip. Main Shaft Extraction by Means of Skips (Hauptschacht-Gefässförderungen), L. Schütt. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 26 and 28, June 28 and July 12, 1924, pp. 665-671 and 729-731, 21 figs. Discusses advantages of skip conveying with automatic emptying at upper end for main shaft operation, and describes plants at Caen (France), Diedenhofen, etc., with capacity of 250-300 tons per hr.

COOKING

Electric. See ELECTRIC COOKING.

Gas. See GAS APPLIANCES, Cookers.

COOLING TOWERS

Calculation. The Calculation of Cooling Towers (Berechnung von Kühltürmen), C. Geibel. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 7, Feb. 16, 1924, pp. 152-153, 1 fig. Setting up heat equations with aid of which cooling-plant values can be determined; points out that laws of current, speed of evaporation, and state of outgoing air are unknown conditions which must be determined.

Efficiency. Water-Cooling-System Efficiency, V. J. Azbe. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 799-805, 12 figs. Formulas and charts for use in predetermining performance of water-cooling systems at different seasons; cooling possibilities under different weather conditions and in different sections of country.

Operation. Analysis of Cooling Tower Operation, C. S. Robinson. Refrig. Eng., vol. 10, no. 6, Dec. 1923, pp. 201-204, 2 figs. Shows how an analysis of operation of cooling towers permits classification of tests, so that a comparison of the various types of towers is simple and accurate; discusses resent tests on cooling towers.

Reinforced-Concrete. The Dimensioning of Reinforced-Concrete Cylindrical Cooling Tower Walls (Bemessung von zylinderförmigen Kühlturmwänden aus Eisenbeton), E. Rausch. Deutsche Bauzeitung, vol. 57, no. 102-103, Dec. 22, 1923, pp. 117-120, 3 figs. Influence of wind forces and temperature; combined effect of wind and temperature stresses; practical example.

Steel. Cooling Towers for Steam Condensing Plant. World Power, vol. 1, no. 2, Feb. 1924, pp. 119-123, 6 figs. Recent designs of steel cooling towers manufactured by Worthington-Simpson, Ltd., for which many advantages are claimed.

Theory. A Theory of Cooling Towers Compared with Results in Practice, B. H. Coffey and Geo. A. Horne. Refrig. Eng., vol. 11, no. 6, Dec. 1924, pp. 187-192 and (discussion) 192-194 and 205, 5 figs. The Omega total-heat relation; cooling surface and heat transfer.

COOPERATION

Railway Shops. See INDUSTRIAL RELATIONS, Coöperative Program; Employees-Management Coöperation.

COOPERATIVE SOCIETIES

Coöperative Shingle Mills. Coöperation. Monthly Labor Rev., vol. 18, no. 1, Jan. 1924, pp. 170-178. Coöperative shingle mills in Western Washington.

Developments. Coöperation. Monthly Labor Rev., vol. 19, no. 6, Dec. 1924, pp. 150-170. Coöperative banking; coöperative housing; failing coöperative societies; relations with trade-union organizations; relations between different forms of coöperation; question of extension of coöperative production; place of women in movement; employees' coöperative buying.

Soviet Russia. Co-operation in Soviet Russia, M. Prokopowitch. Int. Labour Rev., vol. 10, no. 3, Sept. 1924, pp. 411-434. Early effects of

Bolshevist revolution; communist policy in regard to coöperation; new economic policy; present position.

COORONGITE. See OIL, Coorongite.

COPPER

[See also NON-FERROUS METALS.]

Alloys. See COPPER ALLOYS.

Casting. See CASTING, Deoxidized Copper Billets.

Castings. Cupola Castings, T. F. Jennings. Metal Industry (N. Y.), vol. 22, no. 11, Nov. 1924, pp. 444-445. See also Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 927-928. Making copper castings from cupola melted metal.

Making Copper Castings from Cupola Melted Metal, T. F. Jennings. Foundry Trade Jl., vol. 30, no. 427, Oct. 23, 1924, pp. 346-347, 1 fig. Common causes of defects in copper castings; need for deoxidizers; furnace factors; use of cupola in melting copper; cupola preparation; phosphor copper as deoxidizer; hardening copper; pouring heavy castings.

The Deoxidation of Copper and Production of Copper Castings (La désoxydation du cuivre rouge et le moulage d'objets en cuivre), L. Guillet. Revue de Métallurgie, vol. 21, no. 3, Mar. 1924, pp. 174-182, 7 figs. Results of tests made on samples of boron carbide from United States and other samples show that addition of boron carbide to copper produces no interesting effect; addition of small quantities of iron produces complete deoxidation of metal; results of tests on aluminum.

Cold Rolling and Hardness. Effect of Progressive Cold-Rolling on the Brinell Hardness of Copper, H. Moore. Metal Industry (Lond.), vol. 25, no. 14, Oct. 3, 1924, pp. 326-327, 1 fig. Results of experiments; effect of initial cold rolling; time factor; thickness of specimens and hardness results.

Note on the Effect of Progressive Cold-Rolling on the Brinell Hardness of Copper, H. Moore. Inst. of Metals—Advance Paper no. 9, for meeting Sept. 8-11, 1924, 3 pp., 1 fig. Details of experiments made to confirm conclusion that by severe cold-working a metal could be brought into a state in which its hardness would be little or no higher than that of annealed metal and that in this state metal could not be hardened by further cold-work.

Coloring. Coloring Copper and Bronze Work. Sheet Metal Worker, vol. 15, no. 8, May 9, 1924, p. 281. Preparing metal; chemical action explained; recipes for obtaining range of colors; directions on painting.

Corrosion. Seventh Report to the Corrosion Research Committee of the Institute of Metals, G. D. Bengough and R. May. Inst. of Metals—Advance Paper no. 3, for meeting Sept. 8-11, 1924, 176 pp., 35 figs., partly on supp. plates. Deals with corrosion of copper, zinc, 70:30 brass, and condenser tubes. Mainly concerned with mode of formation and behavior of "scales" which form on copper and brass in presence of sea-water.

The Corrosion of Copper and Copper Alloys, U. R. Evans. Chem. & Industry, vol. 43, no. 18, May 2, 1924, pp. 127T-131T, 4 figs. Points out that localized corrosion of copper and brass articles may occur by preferential removal of copper salts from certain points, thus producing concentration cell; by differential aeration (points shielded from oxygen become anodic and suffer attack); by contact with conducting bodies; and by local removal of protective skin.

Deoxidation. See Castings.

Deposits. See COPPER DEPOSITS.

Electrodeposition. Electrodeposition of Copper by the Union Miniere du Haut Katanga (Belgian Congo), H. Y. Eagle. Am. Electrochem. Soc.—Advance paper no. 21, for meeting Apr. 24-26, 1924, pp. 289-297, 6 figs. Describes new electrolytic tank house and its operation; electrolytic tanks are largest of kind ever built.

Electrolytic. Electrolytic Copper, J. G. A. Rhodin. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 560-561. Outline of exhaustive research carried out by late Jos. W. Swan up to autumn, 1893, dealing with stationary and moving cathodes, motion of electrolyte, static effects of detrimental nature; nature of solutions in relation to current density; bright copper deposits; electrolytic gold-leaf; copper wire by direct electrolysis; conductivity of pure electrolytic copper.

Estimation. Applied Methods of Estimating Copper in Ores, Slags, Alloys, etc. Metal Industry (Lond.), vol. 25, no. 9, Aug. 29, 1924, pp. 193-195. Comprehensive treatise of methods of copper estimation in practically all classes of ores, slags, alloys, etc.

Hardness. See Cold Rolling.

Iron in, Effect of. Investigation of the Effects of Impurities on Copper. The Effect of Iron on Copper, D. Hanson and G. W. Ford. Inst. of Metals—Advance Paper no. 7, for meeting Sept. 8-11, 1924, 27 pp., 23 figs., partly on supp. plates. Describes an investigation of effect of small quantities of iron on properties of copper, discussing constitution and microstructure, casting, hot- and cold-rolling, density, hardness, tensile tests, effect of heat treatment, electrical conductivity, fatigue range, notched-bar impact tests, softening after cold work, macrostructure, and machining properties.

Large Crystals, Producing. Forms Large Copper Crystals. Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 929-930, 2 figs. Gradual heating and cooling of pure copper in electric furnace is secret of success in producing large-size crystals giving peculiar physical properties; describes bars, which are really single crystals of pure copper, produced in research laboratory of Gen. Elec. Co., Schenectady.

Mattes, Constitution of. The Constitution of Copper Mattes, F. H. Edwards. Instn. Min. & Metallurgy—Bul., no. 236, May 1924, 19 pp., 59 figs., partly on supp. plates. Preparation of monosulphides of copper and iron, and review of their physical properties and binary system which they form with their respective metals; the matte system proper.

Metallurgy. See COPPER METALLURGY.

Mines. See COPPER MINES.

Prospecting. Flame Test for Copper an Aid in the Study of Croppings, C. H. White. Eng. & Min. Jl.-Press, vol. 117, no. 14, Apr. 5, 1924, pp. 568-569. Advantages of flame test; standardizing flame test; results of experiments.

Rod Rolling Mill. See ROLLING MILLS, Copper-Wire-Rod.

Rolled. Rolled Copper (Einiges über Walzkupfer), Kühnel. Zeit. für Metallkunde, vol. 16, nos. 3 and 4, Mar. and Apr. 1924, pp. 99-103 and 138-141, 15 figs. partly on supp. plate. Author distinguishes between changes of structure and properties due to smelting and congealing and those caused by further treatment; smelting and casting faults; heat treatment of copper; comparison of properties of solid and hollow copper.

Russia. Can Russia Export Copper to Germany? (Kann Russland nach Deutschland Kupfer ausführen?), L. von zur Mühlen. Metall u. Erz, vol. 21, no. 15, Aug. 1, 1924, pp. 359-365. Discusses occurrence of copper, mining, etc., holds that Russian copper mining can be very largely increased by better organization and transportation facilities.

Structure. The Structure of Copper, H. Collins. Chem. News, vol. 129, no. 3361, Sept. 12,

1924, pp. 157-159. As Cu sometimes acts like monad Na, and at other times like dyad Ca, constitution Naca, which was previously obtained for it, is particularly suitable; this constitution has now been proved to be correct.

Sulphide, Estimation from Oxidized Capping. Recent Progress With Leached Ore Capping, H. W. Morse and A. Locke. Economic Geology, vol. 19, no. 3, Apr.-May 1924, pp. 249-256 and (discussion) 256-258. Tries out, in three districts, estimations of sulphide copper from oxidized capping. Offers samples of such capping; makes certain wide assumptions, and joins these assumptions with evidences which samples, in their oxidized state, afford; restores these samples, by these assumptions, to an inferred sulphide condition; and checks this condition against known sulphide below, as a prediction of copper quantity.

United States Production. Copper in 1922, H. A. C. Jenison. U. S. Geol. Surv., no. I:19, 1924, pp. 257-304, 2 figs. Review of production by companies and states; smelter and refinery production; imports and exports, consumption, uses, and prices.

Welding. See ELECTRIC WELDING, Copper.

Wire. See WIRE, Copper.

COPPER ALLOYS

Copper-Aluminum. X-Ray Studies on the Copper-Aluminium Alloys, E. R. Jette, G. Phragmén and A. F. Westgren. Inst. Metals—Advance Paper no. 9, for meeting Mar. 12-13, 1924, 14 pp., 7 figs. X-ray analysis has confirmed previous knowledge that at ordinary temperature four different stable phases appear in this system.

Copper-Cadmium. The Constitution of the Alloys of Copper and Cadmium, C. H. M. Jenkins and D. Hanson. Inst. Metals—Advance Paper no. 8, for meeting Mar. 12-13, 1924, 16 pp., 33 figs. Deals with determination of constitution of alloys of cadmium with copper, especially in solid state; copper and cadmium in liquid state are mutually soluble in all proportions.

Copper-Tin. On the Equilibrium Diagram of the Copper-Tin System, T. Isihara. Inst. Metals—Advance Paper no. 7, for meeting Mar. 12-13, 1924, 31 figs. See also Tôhoku Imperial Univ.—Sci. Repts., vol. 13, no. 1, Oct, 1924, pp. 75-100, 44 figs. partly on supp. plates. Equilibrium diagram of copper-tin system is obtained by means of electric resistance measurement; alpha constituent shows progressive transformation beginning at 480 to 580 deg. cent. according to concentration of tin; maximum solubility of tin in alpha is determined to be 11 per cent at room temperature.

The Estimation of Copper and Tin in Copper-Tin Alloys, A. T. Etheridge. Analyst, vol. 49, no. 581, Aug. 1924, pp. 371-374. Discusses new method consisting of separating copper from sulphuric acid solution by electrolysis, tin being held in solution, and not precipitated by hydrolysis.

The Hardness of Copper-Tin Alloys (Die Härte der Kupfer-Zinnlegierungen), O. Bauer and O. Vollenbruck. Zeit. für Metallkunde, vol. 16, no. 11, Nov. 1924, pp. 426-429, 5 figs. Results of hardness determinations from heretofore published works; new plotting of complete hardness curve; hardness of bronze after quenching.

See also ALLOYS, Non-Ferrous; BRONZES.

Copper-Tin-Zinc. The Ternary System Copper-Tin-Zinc (Ueber das ternäre System Kupfer-Zinn-Zink), G Tammann and M. Hansen. Zeit. für anorganische u. allgemeine Chemie, vol. 139, no. 2, Aug. 19, 1924, pp. 137-161, 20 figs. Discusses formation of red-brass alloys and shows that their structure is dependent to an unusual degree on velocity of cooling after casting.

Copper-Zinc. On the Copper-Zinc Alloys Which Expand on Solidification, Kei Iokibe. Inst. Metals—Advance Paper no. 6, for meeting Mar. 12-13, 1924, 27 pp., 12 figs. Amount of expansion depends upon percentage of copper and rate of cooling; force of expansion is of considerable magnitude; hardness and elastic limit of expanded alloys are low, and they contain cracks and voids; inverse segregation and how its effect can be diminished; cause of inverse segregation.

See also BRASS.

Hardness. The Variation in Hardness of Copper Alloys with Temperature (La variation de la dureté des alliages de cuivre avec la température), L. Guillet. Revue de Métallurgie, vol. 21, no. 5, May 1924, pp. 295-302, 7 figs. Results of tests show that variations of hardness with temperature follow laws which vary considerably for alloys of same category; but in same range of thermal diagram, variations follow same laws to great extent; ternary alloys conserve their hardness better than binary alloys.

COPPER DEPOSITS

Austria. Copper Deposits of Savodenj (Ueber die Kupfererzlagerstätten von Savodenj), Götting. Montanistische Rundschau, vol. 16, no. 18, Sept. 16, 1924, pp. 493-496, 1 fig. Discusses geognostic conditions, character of ore and mining operations.

Canada. Copper Deposits of Arctic Canada, G. M. Douglas. Eng. & Min. Jl.-Press, vol. 118, no. 3, July 19, 1924, pp. 85-89, 5 figs. Discusses British Government explorations, great extent of mineralized area, copper in three forms, deposits at Bathurst inlet, possibilities of high-grade ore, and transportation problem.

Cananea, Mexico. Primary Chalcocite at Cananea, Mexico, G. J. Mitchell. Eng. & Min. Jl.-Press, vol. 117, no. 22, May 31, 1924, pp. 880-882, 10 figs. Discussion of genesis of an important copper mineral.

Cerro de Pasco. Mineral Deposits of Cerro de Pasco (Yacimiento mineral del Cerro de Pasco), F. G. Fuchs. Boletin Minero de la Sociedad Nacional de Mineria, vol. 36, no. 297, Jan. 1924, pp. 3-17, 7 figs. Discusses geology and mineral deposits, copper-silver, lead-zinc-silver and mixtures of these; activity of Cerro de Pasco Copper Co.

Idaho. A New Copper District Near Salmon, Idaho, C. P. Ross. Eng. & Min. Jl.-Press, vol. 118, no. 6, Aug. 9, 1924, pp. 205-208, 5 figs. Geological features show this area to be promising one for prospectors.

Montana. Rôle of Secondary Enrichment in Genesis of Butte Chalcocite, A Locke, D. A. Hall and M. N. Short. Am. Inst. Min. & Met. Engrs.—Trans., no. 1308-M, Mar. 1924, 30 pp., 17 figs. Field argument indicates that either deep chalcocite has replaced sulphide of extraordinarily easy replaceability or it is hypogene; microscopic argument indicates that this sulphide, if it existed, must have been hypogene bornite.

Tennessee. Ducktown, Tennessee, Copper District, W. A. Nelson. Am. Inst. Min. & Met. Engrs.—Trans., no. 1378-M, Oct. 1924, 5 pp. Location; production; general geology and structure; ore bodies.

Oxidation and Enrichment at Ducktown, Tenn., G. Gilbert. Am. Inst. Min. & Met. Engrs.—Trans., no. 1318-M, Mar. 1924, 23 pp., 12 figs. Study of specimens shows that key to both oxidation and enrichment at Ducktown is behavior of pyrrhotite, which is in part dissolved and in part replaced by marcasite; enrichment takes place chiefly at expense of marcasite.

COPPER INDUSTRY

Electricity in. Copper and Electricity, N. R. Stansel. Gen. Elec. Rev., vol. 27, no. 4, Apr. 1924, pp. 214-226, 13 figs. Account of copper

industry, touching on its many different phases; use of electricity in connection with its production.

COPPER METALLURGY

Concentration. See Ore Treatment.

Concentrators. New Cornelia Concentrating Mill at Ajo, Arizona, H. K. Burch. Eng. & Min. Jl.-Press, vol. 118, no. 21, Nov. 22, 1924, pp. 808-821, 13 figs. Details of construction of copper flotation plant; suspension-type bin a feature of storage system; how electric power is distributed; power to pumping plant at 44,000 volts; motor-driven rolls selected for final crushing.

The New Cornelia Copper Company Concentrator, W. L. Du Moulin. Ariz. Min. Jl., vol. 8, no. 10, Oct. 15, 1924, pp. 3-8, 7 figs. Description of 5000-ton concentrator at Ajo, Ariz., for treating of sulphide ores mined by steam shovel methods.

Electric Smelter. See Smelting.

Electrolytic Extraction. Electrolytic Separation of Copper, Antimony, Lead and Tin (Séparation électrolytique du cuivre, de l'antimoine, du plomb et de l'étain), A. Lassieur. Académie des Sciences—Comptes Rendus, vol. 179, no. 17, Oct. 27, 1924, pp. 827-829. With hydrochloric acid, lead and tin are precipitated together, with 20 cu. cm. hydrochloric acid and 5 cu. cm. hydrofluoric acid for a volume of 225 cu. cm. lead and tin are separated.

Electrolytic Separation of Copper, Antimony, and Bismuth from Lead (Séparation électrolytique du cuivre, de l'antimoine, du bismuth d'avec le plomb), A. Lassieur. Académie des Sciences—Comptes Rendus, vol. 179, no. 14, Oct. 6, 1924, pp. 632-634. Details of electrolytic separation by means of hydrochloric acid in presence of a reduction agent, including some improvements.

Greenawalt Electrolytic Copper Extraction Process, W. E. Greenawalt. Am. Inst. Min. & Met. Engrs.—Trans., no. 1284-M, Jan. 1924, 89 pp., 6 figs. Applicable to suitable oxide ores, sulphide ores and concentrates, and low-grade matte; is self-sustaining in acid on sulphide ores or concentrates, mixed ores, and high-grade oxidized ores, and on low-grade oxidized ores amount of acid to be purchased or manufactured is greatly reduced; ferric iron is under easy control, and copper may be effectively deposited from solutions of any acid or iron content likely to be used in copper leaching.

The Lockwood Process. Can. Min. Jl., vol. 45, no. 32, Aug. 8, 1924, pp. 765-768. Details of Lockwood patent process, consisting of crushing (and roasting) ore, making into pulp with water and sufficient H_2SO_4 to effect solution of copper, followed by electrolysis, using simple and inexpensive apparatus.

Use of Electric Current in Copper Production (Die Anwendung des elektrischen Stromes bei der Kupfergewinnung), G. Eger. Siemens-Zeit., vol. 4, no. 8, Aug. 1924, pp. 254-263, 19 figs. Discusses electrolytic process, using aqueous solutions; refining process, using soluble anodes; copper production from lyes by means of insoluble anodes, etc.; electrothermic production of copper from ores; remelting of copper and its alloys; etc.

Leaching. Ammonia Leaching of Calumet and Hecla Tailings, C. H. Benedict and H. C. Kenny. Am. Inst. Min. & Met. Engrs.—Trans., no. 1297-M, Feb. 1924, 16 pp., 5 figs. Description of 2000-ton plant of Calumet & Hecla Min. Co., at Lake Linden, Mich., which has been in almost continuous operation for seven years, together with changes made in original plant, reasons for these changes and results obtained in each case.

An Experimental Copper Leaching Plant at Burra Burra, South Australia, B. DuFaur. Chem. Eng. & Min. Rev., vol. 16, no. 190, July 5, 1924, pp. 381-384. Describes experimental plant capable of treating up to 7 tons of ore at one time; ore particles are dissolved almost solely by either sulphurous or sulphuric acids, made within leaching vat itself and sole function of ferric sulphate is to convert sulphites to sulphates and to produce sulphuric acid.

Progress in Leaching the Ohio Copper Mine, F. E. Wormser. Eng. & Min. Jl.-Press, vol. 118, no. 4, July 26, 1924, pp. 124-127, 8 figs. Production has been increased with larger pumping equipment and costs lowered.

The Electrolytic Tank House, Chile Exploration Company, Chuquicamata, Chile, C. W. Eichrodt. Am. Electrochem. Soc.—Advance Paper no. 23, for meeting Apr. 24-26, 1924, pp. 303-324, 3 figs. Details of tank house operation, including complete analyses of electrolyte, starting sheet manufacture, mechanical handling of copper, proper spacing of electrodes and electrical equipment.

Washing Residues from Copper Ore Leaching, G. D. Van Arsdale. Eng. & Min. Jl.-Press, vol. 118, no. 17, Oct. 25, 1924, pp. 653-655, 2 figs. Some of the principles that are involved and how calculations are made.

Ore Dressing. Concentrator Snapshots, E. H. Robie. Eng. & Min. Jl.-Press, vol. 117, no. 15, Apr. 12, 1924, pp. 596-601, 9 figs. **Impressions** gained on a trip through some of the copper and lead ore-dressing plants of Missouri, Arizona, and Tennessee.

Ore Flotation. See FLOTATION, Copper Ore.

Ore Treatment. The New Copper Queen Concentrator, E. Wittenau. Eng. & Min. Jl.-Press, vol. 117, no. 21, May 24, 1924, pp. 836-841, 10 figs. Results obtained during first year in treatment of a low-grade sulphide ore in Copper Queen concentrator of Phelps Dodge Corpn. at Warren, Ariz., and description of equipment. Three units doing work originally planned for four, making 92 per cent recovery on 2 per cent ore; no ball mills used.

See also COPPER MINING, Africa.

Precipitation. Copper Precipitation, Soulie-Cottineau. Chem. Eng. & Min. Rev., vol. 17, no. 193, Oct. 5, 1924, pp. 13-14. Notes on native copper process. Abstracted translation from Société des Ingénieurs Civils de France.

Smelters. See COPPER MINES, British Columbia.

Smelting. Smelting Copper Concentrates in a Converter, F. J. Longworth. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1366-M, Sept. 1924, 3 pp. Also Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 485-486. Study of converter practice made by Tenn. Copper Co., Copperhill, Tenn., to see if some method could not be evolved to smelt concentrates (their flotation plant delivering to smelter 40 to 50 tons per day) in a converter without preliminary treatment. Data covering performance from Feb. 1, 1923, to June 1, 1924, of 25-ft., 12-ft. diameter Pierce-Smith converter installed, equipped with a close fitting hood and draft just sufficient to keep converter from smoking at mouth.

Technical Developments in Copper Smelting, E. H. Robie. Eng. & Min. Jl.-Press, vol. 117, no. 21, May 24, 1924, pp. 845-849, 5 figs. A commentary on what is going on at some of the southwestern and Tennessee plants.

The Evergreen Electric Smelter, W. R. Lewis. Mountain States Mineral Age, vol. 9, no. 7, July 1924, pp. 11-13, 5 figs. Construction and operation of Evergreen electric smelting plant for treatment of copper concentrate at Apex; equipment is standard throughout except that electric heat is to take place of coke or other fuels.

The New Magma Copper Smelter, H. A. Ruth. Eng. & Min. Jl.-Press, vol. 118, no. 18, Nov. 1,

1924, pp. 685-693, 13 figs. Engineering details of model installation of Magma Copper Co., near Superior, Ariz., equipped with latest features of modern smelting practice. Designed for treating flotation and table concentrates, direct-smelting ores, custom ores, and concentrates.

The United Verde Smelter, G. J. Young. Eng. & Min. Jl.-Press, vol. 118, no. 3, July 19, 1924, pp. 97-101, 10 figs. Discusses recent practice and improvements of smelter; metallurgical practice; treatment of waste furnace gases; Cottrell plant recent addition.

Tailings Treatment. Six-cent Copper from Calumet & Hecla Tailings, C. H. Benedict. Eng. & Min. Jl.-Press, vol. 117, no. 7, Feb. 16, 1924, pp. 277-284, 13 figs. Over 50,000,000 tons of sand, accumulated during half a century, being treated by tabling, flotation, and leaching, by Calumet & Hecla Min. Co., Mich.

COPPER MINES

Africa. The Copper Ores of the Katanga. S. African Min. & Eng. Jl., vol. 35, no. 1702, May 10, 1924, pp. 934-935, 1 fig. Old workings; ore varieties; methods of working; smelting practice. From paper read before Chem., Min. & Met. Soc. by C. H. Luja.

Alaska. Geology and Mining Methods of Beatson Mine, S. Birch. Am. Inst. Min. & Met. Engrs.—Trans., no. 1288-M, Jan. 1924, 7 pp., 4 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 30-31. Latouche, or Beatson plant of Kennecott Copper Corpn., located in Prince William Sound district of Alaska; data on performance and distribution of labor, consumption of timber and explosives, and power requirements.

Geology and Mining Methods of Kennecott Mines, S. Birch. Am. Inst. Min. & Met. Engrs.—Trans., no. 1287-M, Jan. 1924, 12 pp., 2 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 29-30. Notes on geology; methods and equipment employed at principal mines of Kennecott group, viz., Jumbo, Bonanza, Erie, and Mother Lode mines; shrinkage stoping prevailing system; statements of labor efficiency and distribution, consumption of explosives, and power requirements.

Geology of the Beatson Copper Mines, Alaska, A. M. Bateman. Economic Geology, vol. 19, no. 4, June-July 1924, pp. 338-368, 3 figs. Details of formation of Beatson mine of Kennecott Copper Corpn. at Latouche Island, second largest copper mine in Alaska.

Arizona. A Great Mining Adventure, T. A. Rickard. Eng. & Min. Jl.-Press, vol. 117, no. 24, June 14, 1924, pp. 959-963, 2 figs. Story of United Verde extension, at Jerome, Ariz. A successful application of geology.

British Columbia. Britannia Beach Copper District of British Columbia, R. Dunn. Eng. & Min. Jl.-Press, vol. 117, no. 16, Apr. 19, 1924, pp. 640-644, 8 figs. Notes on history of mine, ore bodies, flotation concentration, shrinkage stoping, etc.

Granby Consolidated, R. Dunn. Can. Min. Jl., vol. 45, no. 9, Feb. 29, 1924, pp. 200-209, 11 figs. Description of mines and plants of Granby Consolidated Min. Smelting & Power Co. Ltd., at Anyox and elsewhere. Concentrator and smelter flow sheets. Since 1914 ores of Hidden Creek mine at Anyox have produced in gold 51,141 oz., in silver, 2,610,857 oz., and in copper, 223,481,462 lb. See also Story of Hidden Creek Mine, by J. Flewin, pp. 209-210, 1 fig.

California. Anaconda's Walker Mine and Mill, G. J. Young. Eng. & Min. Jl.-Press, vol. 117, no. 18, May 3, 1924, pp. 725-730, 11 figs. Copper property in California, using shrinkage stoping and flotation concentration.

Chile. Operations of the Chile Exploration Co., Chuquicamata, Chile, W. D. B. Motter. Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 13-16, 4 figs. Description of status of operations and of plant as it exists today; ore reserves and production; copper silicide anodes used.

Italy. See IRON MINES, Italy.

Montana. Something About the World's Biggest Mining Camp at Butte, G. H. Dacy. Compressed Air Mag., vol. 29, no. 3, Mar. 1924, pp. 809-811, 7 figs. Notes on geology, mining, etc., of region in Butte, Montana, producing large quantities of copper, zinc, silver, gold, and lead.

New Mexico. The Chino Enterprise, T. A. Rickard. Eng. & Min. Jl.-Press, vol. 116, nos. 23 and 26, Dec. 8 and 29, 1923, and vol. 117, no. 1, Jan. 5, 1924, pp. 981-985, 1113-1121, and 13-20, 24 figs. Geology of Santa Rita and origin of ore deposits; methods of prospecting and mining; metallurgical operations.

COPPER MINING

Africa. Copper Operations in the Congo, A. E. Wheeler. Min. & Metallurgy, vol. 5, no. 206, Feb. 1924, pp. 55-59, 10 figs. Describes operations of Union Miniere du Haut Katanga; sulphuric acid leaching adopted.

Arizona. Mining Methods of Verde Mining District, A. H. De Witt Smith. Am. Inst. Min. & Met. Engrs.—Trans., no. 1309-M, Mar. 1924, 43 pp., 12 figs. History and geology; ore deposits; exploration; conditions determining stoping methods; underground development plants; mine openings, shafts, or tunnels; drilling and blasting; mining methods; operations.

Utah. Breaking Ore at Utah Copper, G. J. Young. Eng. & Min. Jl.-Press, vol. 118, no. 17, Oct. 25, 1924, pp. 645-649, 17 figs. Procedure followed at Utah Copper mine, in Bingham Canyon, Utah, in drilling, blasting, and sampling, and shovel and car equipment used.

COPPER ORE

Crushing Plant. See CRUSHING, Ore-Crushing Plant.

COPPERSMITHING

Methods. Distillery Apparatus in a Coppersmithing Shop, H. P. Armson. Can. Machy., vol. 31, no. 10, Mar. 6, 1924, pp. 27-30, 3 figs. Description of methods employed in making large sectional drums, pipe connections, etc., at Booth-Coulter Copper & Brass Co.'s plant, Toronto, Can.

CORE BOXES

Valves. Making Globe Valve Corebox, W. C. Ewalt. Foundry, vol. 52, no. 12, June 15, 1924, pp. 483-485, 15 figs. Metal boxes are cast from carefully constructed wood master patterns where foundry output is large; in many cases pattern is built up from number of small segments.

CORE OVENS

Design and Operation. Calculation, Design, and Operation of Economical Core-Ovens (Berechnung, Konstruktion und Betrieb wirtschaftlich arbeitender Trockenkammern), Petin. Giesserei-Zeitung, vol. 21, nos. 7 and 10, Apr. 1 and May 15, 1924, pp. 125-130 and 200-203, 6 figs. Calculation; determination of size of grate, diameter and height of chimney, and cross section of exhaust port for core ovens with open flat-grate furnace and natural draft; determination of theoretical fuel requirement for drying period by means of heat balance.

CORES

Baking. See CORE OVENS.

Binders. Core Oils—Their Composition and Advantages, W. G. Smith. Can. Foundryman, vol.

15, no. 6, June 1924, pp. 13-16, 5 figs. Discusses binders, not only those in oil group, but those of all classes, putting special emphasis on advantages of properly mixed oils over pure linseed oil; linseed is good base but far from perfect; Chinese oils, corn oil, mineral oil, rosin, and fossil gums when properly blended make ideal core binder. Abstract of paper read before Detroit Foundrymen's Assn.

Making. See CORE BOXES.

Oil-Sand. The Technical Side of Oil-Sand Cores, C. W. H. Holmes. Foundry Trade Jl., vol. 29, no. 410, June 26, 1924, pp. 543-547. Selection of suitable sand and oil, preparation of core mixture, baking of oil-sand cores, and description of finished core.

Quantity Production. Producing Cores in Quantities, H. R. Simonds. Foundry, vol. 52, no. 20, Oct. 15, 1924, pp. 797-800, 6 figs. Practice at plant of New England Butt Co., Providence, R. I.; specially designed machine produces slender 3-in. cores for textile-machine castings at rate of from 8000 to 10,000 per week; output equals that of six coremakers.

Supports for. Core and Mould Supports, B. Shaw and J. Edgar. Mech. Wld., vol. 75, nos. 1942 and 1945, Mar. 21 and Apr. 11, 1924, pp. 178-179 and 229-230, 17 figs. Information regarding core and mold grids.

Testing. See FOUNDRY EQUIPMENT, Core and Sand Testing Equipment.

Upward Pressure of. Upward Pressure of ores and Copes, H. Cohen. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 819-820, 2 figs. Buoyancy of cores; pressure head of metal on cores; upward pressure on copes and weighting of flasks.

CORONA

Current-Voltage Relation in. The Current-Voltage Relation in the Corona, C. S. Fazel and S. R. Parsons. Physical Rev., vol. 23, no. 5, May 1924, pp. 598-607, 3 figs. Current-voltage relation for corona discharge between a cylinder and a coaxial wire.

Formation, Hysteresis Character of. The Hysteresis Character of Corona Formation, H. J. Ryan and H. H. Henline. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 825-830, 9 figs. Discusses two items encountered which clearly indicate hysteresis character of corona formation, viz.: (1) value of power lost through corona from a transmission line closely approximates that given by product of charging current and voltage in excess of critical voltage, and (2) dominating importance of crest voltage in relation to corresponding corona loss.

Lightning Arrester. See LIGHTNING ARRESTERS, Corona as.

Losses. Corona Loss Tests on the 202-Mile 60-Cycle 220-Kv. Pit-Vaca Transmission Line of the Pacific Gas and Electric Company, R. Wilkins. Am. Inst. Elec Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1109-1116, 20 figs. Physical and electrical characteristics of 220-kv. transmission likely to affect corona loss; measured corona losses were found to follow exponential laws in three distinct phases; at no point did losses follow quadratic law. (Abridgment.)

Corona Losses Between Wires at Extra High Voltages, C. F. Harding. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 932-940, 26 figs. Results of corona loss tests upon three sizes of cables at voltages varying from 100 to 620 kv. and spacings from 18 to 38 ft. are reported from Eng. Experiment Station of Purdue University; these results, reduced to standard 1000 ft. of trasmission line, are compared with corresponding values calculated from Peek's formula for similar conditions of operation; describes tower line and method of measurement of losses in high-voltage circuit; three methods of attacking problem of modified transmission-line design for elimination of excessive corona losses are outlined.

Theoretical Computation of Corona Losses (Teoretisk beräkning av coronaförluster), R. Holm. Teknisk Tidskrift, vol. 54, no. 1, Jan. 5, 1924, pp. 9-12 (Elektroteknik), 2 figs. Short description of a new method for computation of corona losses in high-tension transmission lines. States that corona losses are due to exchange of electrical charges in surrounding air, which require electrical energy in excess of that corresponding to capacity of wires, and object of investigation is to compute these charges.

CORROSION

Alloys. See METALS, Corrosion.

Aluminum. See ALUMINUM, Corrosion.

Boilers. See BOILERS, Corrosion.

Cast Iron. See CAST IRON, Decomposition by Acid.

Chemical Plants. Corrosion and Its Relation to Safety in Chemical Plant, J. H. Shapleigh. Chem. Age (N. Y.), vol. 32, no. 10, Oct. 1924, pp. 401-404. Definition of corrosion; corrosion in chemical plant; hazards caused by corrosion; selection of suitable materials; factors lessening corrosion.

See also CHEMICALS, Manufacture, Corrosion Problems in.

Chemistry of. See METALS, Corrosion.

Coal Gas as Cause. See COAL GAS, Corrosion Due to.

Coatings, Formation of. Coatings Formed on Corroded Metals and Alloys, Geo. M. Enos and Rob. J. Anderson. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 594-595. Experiments on coating formation. (Abstract.)

Condenser Tubes. See CONDENSERS, STEAM, Tubes.

Copper. See COPPER, Corrosion.

Electrolytic. Electrolytic Corrosion in a Water-Gas Holder, F. H. Rhodes and E. B. Johnson. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, p. 575. Describes special case of electrolytic corrosion and gives results of investigation.

The Electrolytic Theory of Corrosion, W. D. Bancroft. Jl. Physical Chem., vol. 28, no. 8, Aug. 1924, pp. 785-871. Reviews electrolytic theory and criticizes some conclusions based on it.

Engine Parts. See AUTOMOBILE ENGINES, Corrosion.

Gas Holders. See GAS HOLDERS, Corrosion.

Gas Mains. See GAS MAINS, Corrosion.

Gas Meters. See GAS METERS, Carbonic Acid Corrosion.

Gas-Works Equipment. See GAS MANUFACTURE, Corrosion Problems.

Iron. See IRON, Corrosion.

Iron Alloys. See IRON ALLOYS, Corrosion.

Iron and Steel. A Critical Résumé of Information on Corrosion of Iron and Steel, D. V. Onslow. World Power, vol. 2, no. 9, Sept. 1924, pp. 146-155, 4 figs. With special reference to cast iron to resist sea water.

Recent Progress in the Study of Corrosion, J. Newton Friend. West of Scotland Iron & Steel Inst.—Jl., vol. 31, part 5, Feb. 1924, pp. 74-83, and (discussion) 84-87, 11 figs., on supp. plates. Theories of corrosion; corrosion in moving liquids; colloid theory; influence of humidity, and of dis-

solved salts; action of alkalies on iron; influence of temperature; corrosion and overstrain.

Report of Committee on Corrosion of Ferrous Metals. Am. Foundrymen's Assn.—Preprint no. 445, for meeting Oct. 11-16, 1924, 9 pp., 11 figs. Accelerated spray tests on cast iron, cast steel and malleable; recommendations.

Rust and Its Causes, J. D. Frazer. Minn. Federation Architectural & Eng. Soc.—Bul., vol. 9, nos. 7 and 8, July and Aug. 1924, pp. 15-18 and 21-26, 2 figs. Discusses history of manufacture of iron and steel, purity of ancient iron, difference in products of open hearth and puddling furnace.

See also IRON AND STEEL, Corrosion.

Metallic. The Mechanism of Metallic Corrosion, G. D. Bengough and J. M. Stuart. World Power (formerly Beama), vol. 1, no. 1, Jan. 1924, pp. 25-34, 1 fig. Direct union with oxygen; hydrogen-displacement type of oxidation; formation of and changes in initial scale; corrosion of typical metals.

Metals. See METALS, Corrosion; Corrosive Agent, Behavior Under Action of; Protection.

Monel Metal. See MONEL METAL, Corrosion.

Muntz Metal. The Corrosion of Muntz Metal in Sea Water, W. Donavan and T. E. Perks. Chem. & Industry, vol. 43, no. 13, Mar. 28, 1924, pp. 72T-75T, 5 figs. Investigation into cause of occasional rapid corrosion of metal sheathing on Otaika Bridge, New Zealand; micrographical examination. See also succeeding article by T. E. Perks, entitled, The Corrosive Action of Brackish Waters on Metals, pp. 75T-77T, 2 figs.

Pipe. See PIPE, Corrosion.

Prevention. Corrosion Prevention. Machy. Market, no. 1239, Aug. 1, 1924, pp. 17-18, 4 figs. Special reference is made to "bitumastic" specialties which are now made in various shades; black solution is quick drying and has great durability forming impervious film over metal, effectively keeping out causes of corrosion, while cracking and peeling from movement of metal due to change of temperature is entirely prevented by elastic nature of solution.

Rust Removal. The Removal of Rust by Electrolytic Processes, J. P. McLare. Engineering, vol. 117, no. 3027, Jan. 4, 1924, pp. 25-29, 5 figs. Results of experiments with alkaline bath; efficiency of bath; describes plant and its development; cost of installation.

Ships. See SHIPS, Corrosion in.

Soil. Soil Corrosion Investigation, K. H. Logan. Am. Foundrymen's Assn.—Preprint no. 446, for meeting Oct. 11-16, 1924, 21 pp. Investigation by U. S. Bur. Standards of action of soils on buried pipes; tests of pipe materials, protective coatings, brass pipe fittings, and miscellaneous materials; determination of corrosion of specimens; discussion of progress report of soil-corrosion investigation.

Steam-Turbine Blades. See STEAM TURBINES, Blading.

Steel Plates. See STEEL, Plates, Corrosion-Resistance Tests.

Steel, Submerged. See STEEL, Submerged Corrosion.

Study of. A Paradox in Corrosion, U. R. Evans. Chem. & Met. Eng., vol. 30, no. 24, June 16, 1924, pp. 949-953, 3 figs. Mechanism by which currents are produced explains why corrosion depending on oxygen is sometimes greatest where oxygen is excluded.

Sugar Mills. Corrosion in Piping and Steam Turbines in Sugar Mills, I. McNiece. La. Planter & Sugar Mfr., vol. 73, no. 22, Nov. 29, 1924, pp. 428-429. Discusses corrosion caused by chemical action and corrosion traceable to usual attrition or abrasion of physical and material contact.

See also SUGAR MANUFACTURE, Corrosion Problems in.

Tarnishing and. The Relation Between Tarnishing and Corrosion, U. R. Evans. Am. Electrochem. Soc.—Advance Paper no. 6, for meeting Oct. 2-4, 1924, pp. 75-100, 7 figs. partly on supp. plate. Describes investigations into attack of gaseous sulphur dioxide on iron and zinc, and that of hydrogen sulphide on copper, with special reference to part played by water in each case, and also to essential difference between tarnishing and corrosion proper.

Tin Food Containers. The Corrosion of the Tin Container by Canned Foods, H. W. Powell and E. W. McHenry. Can. Chem. & Metallurgy, vol. 8, no. 8, Aug. 1924, pp. 185-186. Discusses subject of corrosion of food containers, pointing out certain of the factors involved and methods of controlling them. States that subject requires extensive research work before a practical solution can be reached.

Water Pipes. See WATER PIPES, Corrosion.

Zinc and Lead. The Relative Corrosion of Zinc and Lead in Solutions of Inorganic Salts, J. N. Firend and J. S. Tidmus. Inst. Metals.—Advance Paper no. 4, for meeting Mar. 12-13, 1924, 9 pp., 4 figs. Influence of alkali salts upon relative rates of corrosion of zinc and lead closely resembles that already observed in case of iron; satisfactory explanation can be offered to account for this.

COST ACCOUNTING

Balance-Sheet Analysis. A Method of Balance Sheet Analysis, A. Gilman. Mgmt. & Administration, vol. 8, no. 2, Aug. 1924, pp. 147-150. Deals with plan which compares a given balance sheet with earlier balance sheets of same company, describing new method called "index method." Comparison of "ratio method" and "index method." Advantages of "index method."

Balance Sheet Analysis, A. Wall. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 521-524. Purpose is to read figures of series of balance sheets so as to bring out more clearly, or emphasize, trends or strains in financing not easily recognizable in dollar figures.

Capital Requirements and Control. Capital Requirements and Control, J. H. Bliss. Mgmt. & Administration, vol. 7, nos. 4, 5, and 6, Apr., May, and June, 1924, pp. 405-410, 529-532, and 653-658. April: Control of fixed property investments. May: Surplus and its constructive application. June: Protection of working capital.

The Operating and Financial Ratios Characteristics of Industries, J. H. Bliss. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 155-160. Characteristic ratios of operating results; characteristics within industries; statistics on volume costs and margins; changed relationships in readjustment period; characteristic margins and expense ratios; contrast in turnovers.

The Story Told by the Financial and Operating Statements, J. H. Bliss. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 25-30. Author takes typical financial statement and analyzes it so as to show wide range of essential information that can be drawn from its figures.

Costs and Inventory Records. Combined Record System for Costs and Inventory, Wm. L. Myles. Am. Mach., vol. 60, no. 16, Apr. 17, 1924, pp. 575-578, 6 figs. All records of labor and material kept in visible index; description of forms; how costs are determined; purchasing index and payroll statistics.

Crushed-Stone Industry. Cost Accounting in the Crushed Stone Industry, D. J. Hutchinson. Pit & Quarry, vol. 8, no. 12, and vol. 9, nos. 1, 2, 3, 4, and 5, Sept., Oct. 1, 15, Nov. 1, 15, and Dec. 1, 1924, pp. 89-92, 77-81, 67-72, 81-86, 105-110, and 105-108, 4 figs. Sept.: Cost accounting in its relation to selling prices, application of uniform accounting methods and material as an element of cost. Oct. 1: Expense analysis and distribution. Oct. 15: Principles and basis of expense distribution. Nov. 1: Application of these methods to actual cost figures. Nov. 15: General ledger control. Dec. 1: Methods of determining depletion.

Depreciation. A Statistical Theory of Depreciation, Based on Unit Cost, J. S. Taylor. Mass. Inst. Technology—Dept. of Mathematics Pub., Series 2, no. 71, Feb. 1924, pp. 1010-1023. Discusses methods of treating depreciation, dealing with "useful life" of machine, or number of years property will be used, and how depreciation charges are to be distributed over period of use. Reprinted from Am. Statistical Assn., Dec. 1923.

New Forms of Depreciation Schedules, G. W. Greenwood. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 689-692, 3 figs. Outlines method called sinking-fund method, which is believed to be new and to have advantages in many cases; comparison with straight-line method.

Executives. Costs for Executives, N. A. Hall. Indus. Mgmt. (N. Y.), vol. 67, no. 6, and vol. 68, nos. 1, 3, and 5, June, July, Sept., and Nov. 1924, pp. 325-328, 14-17, 135-138, and 283-286. June: Relationship between books and costs. July: Foundation of cost system. Sept.: Where burden comes from. Nov.: Equitable distribution of burden.

Industrial Cost Accounting for Executives, P. M. Atkins. Am. Mach., vol. 60, nos. 6, 7, 9, 10, 11, and 12, Feb. 7, 21, 28, Mar. 6, 13, and 20, 1924, pp. 201-204, 287-290, 329-333, 353-356, 403-406, and 433-434, 1 fig. Feb. 7: Standard practice instructions; installing system of cost accounts. Feb. 21: Design of forms to be used in facilitating keeping of cost records. Feb. 28: Coördination of cost records and general accounts. Mar. 6: Cost statistics and two methods of their visualized presentation; comparative reports. Mar. 13: Cost-accounting service to production control; auditing work of planning departments; comparative cost data for foreman. Mar. 20: Factory control by means of cost accounts; analyzing qualities of executive.

Factory. Connection Between Factory and Accountancy Bookkeeping (Zusammenhang zwischen Betriebs- und Kaufmännischer Buchhaltung), F. Schönberger. Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1139-1144, 7 figs. Explains connection between cost accounting and general bookkeeping by means of graphic diagrams; distribution of general expenses over individual cost; etc.

Finding and Making Use of Factory Costs, A. W. Rowley. Indus. Mgmt. (N. Y.), vol. 67, no. 4, Apr. 1924, pp. 195-200, 11 figs. Describes cost system successfully adopted by Harder Mfg. Corpn., manufacturers of silos and refrigerators.

Urgent Problems of Factory Organization and Their Natural Solution (Brennende Probleme der Betriebsorganisation und ihre natürliche Lösung), Geo. Schlesinger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 19, May 10, 1924, pp. 459-462, 4 figs. It is shown that the best scheme of factory organization is that in which cost accounting goes hand in hand with production: in other words, cost accounting should be a by-product of whole activity of plant.

Foundries. See FOUNDRIES, Cost Accounting.

Function of, Measuring. Evaluating the Cost Department. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 477-479. Varying views of cost accountants, engineers, and others on possibility of measuring cost-accounting function.

General-Expense Allocation. See FOUNDRIES, General Expenses, Allocation of.

Heat-Treating Department. The Complete Operation of a Practical Cost System, A. H. Gibson. Factory, vol. 32, no. 2, Feb. 1924, pp. 170-172, 234 and 236, 1 fig. Deals principally with problems of cost accounting in heat-treating department.

Highway. See HIGHWAYS, Cost Accounting.

Inventory Methods. A Simple Perpetual Inventory System, C. J. Morrison. Am. Mach., vol. 60, no. 5, Jan. 31, 1924, pp. 175-176, 3 figs. Simple and convenient perpetual inventory system for small shop; application to various classes of manufacturing; small amount of clerical work involved.

Keeping Perpetual Plant Inventory, W. C. Sponenburg. Telephony, vol. 86, no. 7, Feb. 16, 1924, pp. 21-23. Method, employed by Glen Telephone Co., Gloversville, N. Y., found most helpful in preparing reports for state tax and public-service commissions.

Quantity Control of Inventories, E. K. Wennerlund. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 677-682, 5 figs. Physical regulation contrasted with mere financial information; purpose of inventory control; classification of inventory; control of production materials; scheduling of purchase orders; follow-up of purchase orders; physical handling of materials.

Job Costing. A Simple System of Job Costing. Mar. Engr. & Nav. Architect, vol. 47, no. 557, Feb. 1924, pp. 66-67, 2 figs. Costing as a science; cost-recording essentials; labor rate and materials rate; prime cost cards.

Machine Shops. Costs and a Cost System, H. P. Dix. Am. Mach., vol. 60, no. 23, June 5, 1924, pp. 853-855. How to determine what list price should be; what records are necessary in cost system; information that can be used by any maker of machinery.

Machines for. See CALCULATING MACHINES, Cost-Accounting.

Manufacturing Costs. Notes on Manufacturing Costs, J. de Boisgrollier. Foundry Trade Jl., vol. 30, no. 436, Dec. 25, 1924, pp. 543-544. Points out danger of quoting average prices; basic conditions for fixing cost; method advocated for control of manufacturing costs. Translated from paper presented to Assn. Technique de Fonderie.

Mines. See MINES, Cost Accounting.

Point Method. Getting at Costs by the "Point Method," R. E. Roesler. Factory, vol. 32, no. 5, May 1924, pp. 662-663, 2 figs. Describes point cost method and its applications.

Production Costs. Calculation of Cost of Production and Bookkeeping (Selbstkostenberechnung und Buchhaltung), R. Doczekal. Sparwirtschaft, vol. 1, no. 21-24, Nov.-Dec. 1924, pp. 109-112 (AWB), 1 fig. Conditions to be fulfilled where cost keeping and bookkeeping are closely interconnected.

Pulp and Paper Mills. Accounting in Pulp and Paper Mills, Thos. J. Burke. Paper, vol. 35, no. 10, Dec. 25, 1924, pp. 405-407. Segregating fixed assets to get correct costs and proper estimation of receipts and expenses important to every accountant.

Rubber-Tire Manufacture. See TIRES, RUBBER, Manufacturing Costs.

Small Plants. Correct Costs at Little Expense, G. G. Thompson. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 517-520. System for small and medium-size plant.

System. See INDUSTRIAL MANAGEMENT, Planning.

Wastage in Relation to. The Wastage of Industrial Plant in Relation to Cost Accounting, A. Stewart. World Power, vol. 1, no. 6, June 1924, pp. 318-324, 4 figs. Nature of wastage; methods of measuring depreciation; plant register; cost of additions; repairs and renewals; inclusion of plant register.

Water-Works. See WATER WORKS, Cost System.

COSTS

Control of. See INDUSTRIAL MANAGEMENT, Cost Control.

Machine-Shop. How to Estimate Machine Shop Costs, A. A. Dowd. Am. Machinist, vol. 61, no. 6, Aug. 7, 1924, pp. 227-230, 3 figs. Estimates of machining time on spline-milling operations; practical examples of keyway and slot cutting; gear milling and hobbing estimates.

See also COST ACCOUNTING, Machine Shops.

Production, Calculation of. Calculating Cost of Production (Selbstkostenberechnung), R. Klanner. Sparwirtschaft, vol. 1, no. 15-16, Aug. 1924, pp. 76-78. Discusses calculation of cost of production in a medium-sized machine works with quantity production and order business.

Calculating Cost of Production (Selbstkostenberechnung), E. Schubert. Sparwirtschaft, nos. 9-10 and 11-12, May and June 1924, pp. 49-51 and 57-60. Series of articles based on reports of Cost of Production Committee and giving examples of calculation from new viewpoints.

Cost of Production and Its Determination (Die Selbstkosten und ihre Erfassung), F. Kresta. Sparwirtschaft, no. 19-20, Oct. 1924, pp. 97-105 (AWB), 15 figs. Analyzes direct, indirect, constant, and variable costs, and gives samples of record cards used.

Standard, System. Establishing Standard Cost, R. W. Darnell. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 51-56, 5 figs. Describes system of standard costs showing its operation and its advantages over other cost systems in common use.

COTTON

Breaking Load of. The Effect of Treatment with Sulphuric Acid on the Breaking Load of Cotton, P. D. Vincent. Textile Inst.—Jl., vol. 15, no. 5, May 1924, pp. T281-T290, 7 figs. Effect of treatment with sulphuric acid of various concentrations at room temperature on breaking load of cotton hairs and yarns has been actually measured; kier boiling increases breaking load of untreated yarn but still further weakens weaker acid-treated yarns.

Humidity and Elastic Properties. The Influence of Humidity on the Elastic Properties of Cotton, F. T. Peirce. Textile Inst.—Jl., vol. 15, no. 11, Nov. 1924, pp. T501-T518, 5 figs. Discusses rigidity of raw cotton hairs at 20 deg. cent., and the modulus of rigidity at the same temperature.

Moisture Relations. The Moisture Relations of Cotton, A. R. Urquhart and A. M. Williams. Textile Inst.—Jl., vol. 15, nos. 9 and 12, Sept. and Dec., 1924, pp. T433-T442 and T559-T572, 13 figs. Sept.: Absorption and desorption of water by soda-boiled cotton at 25 deg. cent. Dec.: Effect of temperature on absorption of water by soda-boiled cotton.

Research Work. Practical Application of Research Work, E. D. Walen. Textile World, vol. 65, no. 5, Feb. 2, 1924, pp. 161-162, 4 figs. Work of Cotton Research Co.; analyzes mill problems both in mill and laboratory with coöperation of practical mill men.

Stress-Strain Relationships. The Stress Strain Relationships of Cotton Hairs—The Time Factor, Geo. E. Collins. Textile Inst.—Jl., vol. 15, no. 11, Nov. 1924, pp. T519-T528, 4 figs. Deals with changes in dimensions of single cotton hairs under longitudinal stresses in their relation to time of application of loads.

COTTON INDUSTRY

Physical Research. Physical Research in the Cotton Industry, A. E. Oxley. Manchester Literary & Philosophical Soc.—Memoirs & Proc., vol. 68, no. 1, 1924, pp. 69-80, 16 figs., partly on supp. plates. Applications of physical methods to spinning, weaving, and finishing sections of trade; indicates how physical properties of finished fabric may be measured by aid of purely physical determinations.

COTTON MILLS

Compressed Air in. See COMPRESSED AIR, Cotton Mills.

Conveyors for. See CONVEYORS, Cotton-Mill.

Dust Removal. See DUST, Removal of.

Electric Motors for. Selecting Motors for Cotton Mills, Wm. S. Maddocks. Elec. World, vol. 83, no. 6, Feb. 9, 1924, pp. 272-277, 9 figs. Reasons why standard motors suitable for other plants have been found unsatisfactory; tendencies toward individual drive continue to manifest themselves in this industry.

Mechanical Engineering and Management. The Relation of Mechanical Engineering to Management in the Textile Industry, E. H. McKitterick. Mech. Eng., vol. 46, no. 6, June 1924, pp. 343-344 and 359. Reduction of cost of manufacture by means of improvements in power, lighting, and heating systems, and in handling of goods between processes.

Power Costs. Power Costs in Cotton Mills. Elec. World, vol. 83, no. 13, Mar. 29, 1924, pp. 621-623, 9 figs. Survey of conditions in twenty mills; relative values of all cost elements; purchased vs. made power and combinations; analysis of load conditions.

COUNTERBORES

Manufacture of. Manufacturing Interchangeable Counterbores. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924; pp. 943-947, 15 figs. Also Machy. (Lond.), vol. 24, no. 619, Aug. 7, 1924, pp. 592-596, 15 figs. Unusual operations and fixtures employed by Gairing Tool Co., Inc., Detroit, Mich., in making counterbores and holders.

COUPLINGS

[See also CLUTCHES.]

Compression. Making Couplings For Transmission of Power, H. P. Armson. Can. Machy., vol. 31, no. 13, Mar. 27, 1924, pp. 19-21, 3 figs. Shop methods and tools in plant of Bond Eng. Works, Toronto, Can., for machining double tapered sleeves and inner and outer shells for compression couplings.

Construction and Uses. Construction Details and Use of Clutches and Cutoff Couplings, F. E. Gooding. Indus. Engr., vol. 82, nos. 1 and 2, Jan. and Mar. 1924, pp. 5-9 and 127-130, 29 figs. Construction and operation of friction and magnetic clutches and cut-off couplings, and information necessary when ordering and installing them.

Hydraulic. See OIL ENGINES, Hydraulic Couplings.

Safety, for Machine Drives. Safety Couplings for Machine Drives, F. Osgood Hickling. Am. Mach., vol. 61, no. 24, Dec. 11, 1924, pp. 921-923, 7 figs. Devices to prevent damage to machines when drives or feeds are overloaded, and

which take place of "breaking pin" in light machines.

Shaft. Cast-iron Shrouded Shaft Couplings. Machy. (Lond.), vol. 24, no. 619, Aug. 7, 1924, pp. 582-583, 1 fig. Also (comment by W. R. Needham) no. 626, Sept. 25, 1924, pp. 816-817, 1 fig. Table giving modern proportions of shaft couplings and additional information that is required when designing a coupling.

CRANES

Balance-Weight Determination. Determination of Additional Weight—Ballast and Balance Weight—in Revolving Cranes (Bestimmung des Zusatzgewichtes—Ballast und Gegengewichte—bei Drehscheibenkranen), W. Hilge. Fördertechnik u. Frachtverkehr, vol. 17, no. 3, Feb. 3, 1924, pp. 29-31, 3 figs. Gives simple method for determining additional weight as the only possible minimum; by this means production and freight are rendered cheaper; current supply of slewing motor is reduced and control of crane is made easier.

Bearings. See BEARINGS, ROLLER, Shipbuilding.

Bridge. Columbia Digger Unloading Plant at Portland. Rock Products, vol. 27, no. 16, Aug. 9, 1924, pp. 35-37, 7 figs. West coast sand producer uses bridge crane of excellent design for unloading barges and putting sand and gravel into storage.

Building Material. See CONVEYORS, Building-Construction.

Cantilever. Cantilever Crane with Combined Counterbalance for Lifting Work and Weight of Load (Auslegerkran mit vereinigtem Hub-Arbeits- und Lasthöhenausgleich), V. Hirschhaut. Fördertechnik u. Frachtverkehr, vol. 17, no. 13, July 8, 1924, pp. 180-181, 1 fig. Details of design of new patent in which load jib is provided with rigid counterweight jib, with chain from drive to load and counterweight, etc.

Chains. See CHAINS, Crane.

Change-Gear. Hoists with Change-Wheel Drives (Hebezeuge mit Wechselgetrieben), W. Claes. Zeit. des Vereines deutscher Ingenieur, vol. 68, no. 48, Nov. 29, 1924, pp. 1247-1249, 9 figs. Describes new type of crane developed by firm of Arn. Georg, known as AGO crane; increased efficiency is demonstrated by comparison with other types; its practical importance for different special purposes.

Combination Pile Driver and. Combination Heavy Duty Crane and Pile Driver. Ry. Age, vol. 76, no. 15, Mar. 15, 1924, pp. 757-758, 2 figs. Machine built by Brown Hoisting Co. for Northern Pacific is capable of driving piles straight ahead or on either side of track; it may be revolved 360 deg. in either direction and piles may be driven at any point within circumference of 32-ft. circle.

Control, Electric. New Controls for Grab Cranes (Neue Steuerungen für Greiferkrane), F. Rothe. Siemens-Zeit., vol. 4, no. 9, Sept. 1924, pp. 318-325, 11 figs. Discusses different types of grab cranes for handling bulk goods, including two-chain cranes with two-motor control systems.

Crawler. Crawler Crane Built for First Time in Canada, H. P. Armson. Can. Machy., vol. 32, no. 3, July 17, 1924, pp. 19-21 and 42, 3 figs. Designed and built by J. T. Hepburn, Ltd., Toronto, for service in civic yards.

Derricks. See DERRICKS.

Double. Double Cranes in Port of Hamburg. Port & Terminal, vol. 4, no. 2, Mar. 1924, p. 20. Particulars of new crane, put out by Deutsche Maschinenfabrik A. G., Duisburg (Demag), for cargo handling; constructed along new lines, represents a combination in the building of two different types of cranes.

Electric. Electric Level-Luffing Cranes, W. A. Perry. Elec. Rev., vol. 94, no. 2412, Feb. 15, 1924, pp. 248-249, 2 figs. Describes 7-ton dock-side cranes supplied to Ardrossan Harbor Co., Scotland.

See also Traveling.

Electric Current for, Choice of. Choice of Current for Hoists with Special Regard to Harbor Cranes (Wahl der Stromart für Hebezeuge unter besonderer Berücksichtigung der Hafenkrane), H. Gettert. Elektrotechnische Zeit., vol. 45, no. 16, Apr. 17, 1924, pp. 353-359, 17 figs. Author seeks to ascertain which kind of current is most economical with regard to energy consumption.

Electric Equipment. Modern Single-Phase Crane Equipment of Brown, Boveri & Cie (Moderne Einphasen-Kran-Ausrüstungen der Brown, Boveri & Cie., A.-G.), H. Gettert. Fördertechnik u. Frachtverkehr, vol. 17, no. 5, Mar. 3, 1924, pp. 59-65, 28 figs. Advantages of Deri motors for drive of hoists; design and operation of motors; selection of control apparatus and arrangement of control for different types of cranes; control of Deri motors with controller and resistance.

Floating. A Self-propelled 350-Ton Floating Crane. Engineer, vol. 137, no. 3563, Apr. 11, 1924, p. 396, 8 figs., partly on supp. plate. Crane under erection in Japan designed to lift working load of 350 tons at 100-ft. radius; built by Cowans, Sheldon & Co., Carlisle.

See also DREDGES, Harbor.

Foundry. Calculation of a Foundry Crane (Berechnung eines Giessereidrehkranes), P. Meerholz. Praktische Maschinen-Konstrukteur, vol. 57, nos. 8 and 10, Mar. 1 and 25, 1924, pp. 88-90 and 122-124, 3 figs. Calculation and design of a slewing crane of 3000 kg. capacity, 6 m. radius, and 4 m. lift. Calculation of braking force required.

Gap. See RAILWAY REPAIR SHOPS, Locomotive.

Harbor. Improvements in the Construction of German Loading and Unloading Equipment (Neuerungen im Bau von deutschen Umchlaganlagen), Buhle. Bautechnik, vol. 2, no. 12, Mar. 18, 1924, pp. 125-142, 61 figs. Deals with mechanical equipment for ship loading and unloading, giving numerous examples of modern harbor cranes, and auxiliary equipment.

Modern Crane Plants for Waterways, River and Sea Ports and Docks (Neuzeitliche Krananlagen für Wasserstrassen, Binnen und Seehäfen sowie für Werften), K. Zapf. Schiffbau, vol. 25, nos. 19 and 20, July 9 and 23, 1924, pp. 521-525 and 547-550, 18 figs. Details of design and operation of various types of cranes built by the Ardeltwerke.

See also Electric Current for, Choice of.

Hydraulic, Air-Chamber Filling Device. Automatic Device to Fill the Air Chambers of Hydraulic Cranes With Compressed Air (Vorrichtung zum selbsttätigen Auffüllen der Windkessel von Wasserkranen mit Druckluft), G. Wagner. Verkehrstechnik, vol. 41, no. 15, Apr. 11, 1924, pp. 139-141, 2 figs. Improved design illustrated and described.

Industrial. Devices for Grappling Loads for Cranes (Die Lastaufnahmemittel der Krane), R. Hänchen. Maschinenbau, vol. 3, no. 16, May 22, 1924, pp. 567-575, 31 figs. Discusses conveying apparatus for bulk goods; describes types of grabs, tipples, etc.

Jib. "Toplis" Luffing Cranes at Southampton Docks. Engineering, vol. 117, no. 3050, June 13, 1924, pp. 762-763, 4 figs., partly on p. 768. Patent horizontal-luffing type, consisting of traveling truck, in which is mounted a rotating steel

lattice structure, forming a mast and carrying jib and combined machinery house and operator's cabin.

Locomotive. Locomotive Cranes (Grue per sollevamento locomotive), F. Scheuermann. Ingegneria, vol. 3, no. 8, Aug. 1, 1924, pp. 283-285, 8 figs. Details of design and construction of cranes of capacities of up to 80 tons.

Putting Locomotive Cranes to Work, Geo. E. Titcomb. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 475-478, 10 figs. Discusses types which are of greatest use in manufacturing plants.

Standardization of Locomotive Cranes as Auxiliary Equipment for Use with Steam Shovels, J. C. Wheat. Min. Congress Jl., vol. 10, no. 4, Apr. 1924, pp. 171-173, 4 figs. Points out that two or three sizes should be developed to fulfill whatever special requirements are necessary for mining industry.

Overhead, Erection of. Erection of Overhead Crane Made Easy, Wm. L. Laing. Power, vol. 60, no. 22, Nov. 25, 1924, pp. 836-839, 8 figs. Methods of handling crane parts.

Overhead vs. Gantry. Comparative Cost of Electric Traveling and Gantry Cranes, Wm. L. Laing. Am. Mach., vol. 60, no. 9, Feb. 28, 1924, p. 318. Assumptions and figures which, when corrected to suit local conditions, can be used as guide.

Power-Plant. Types of Cranes for the Power Plant. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 846-848, 4 figs. Crane capacity may be determined by weight of equipment to be installed in future.

Quay. The Design of Quay Cranes, F. M. Du Plat Taylor. Engineer, vol. 137, no. 3570, May 30, 1924, p. 598, 2 figs. Suggests arrangement and design of cranes to meet requirements of modern large sea-going vessels.

Self-Propelling. A French Automobile Crane. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 604-605, 2 figs. Type of self-propelled crane extensively used in France for railway siding and port work, as well as for town and city transport and cleaning services.

Shop. Shop Cranes (Werkstätten-Innendienstkrane), R. Hänchen. Praktische Maschinen-Konstrukteur, vol. 57, nos. 37 and 38, Sept. 30 and Oct. 7, 1924, pp. 501-504 and 513-518, 24 figs. Construction and application of cranes used in workshops, including traveling, jib, slewing, and other types; cranes in shops consisting of a number of halls; floor cranes with and without tracks.

Slings. Use of Slings for Heavy Parts. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 955-957, 5 figs. Safety suggestions for crane followers in connection with use of slings and making hitches.

Traveling. A Special Running Shed Crane Equipment on the Pennsylvania Railway. Ry. Gaz., vol. 41, no. 2, July 11, 1924, p. 43, 3 figs. Particulars of ten-ton electric overhead traveling crane, operating on circular track and having all wheels of same diameter, at Columbus, Ohio, enginehouse of Penn. Ry.

Direct or Alternating Current for Overhead Traveling Cranes, Wm. L. Laing. Am. Mach., vol. 60, no. 4, Jan. 24, 1924, pp. 133-134. Advantages and disadvantages of each type; selecting crane motor with characteristics to fit work; speed, braking, overload capacity, service, and other characteristics.

5-Ton Underhung-Jib Crane. Engineer, vol. 136, no. 3550, Jan. 11, 1924, pp. 48-49, 3 figs. Describes overhead traveling crane with underhung jib, object of which is to reach into adjoining bays, or even beyond end of shop in which it is installed, and thus enable loads to be lifted and transferred from shop to shop without use of tramways or trucks.

Materials-Handling Equipment of the New Docks of Cambrai, France (Les appareils de manutention mécanique des nouveaux docks de Cambrai). Génie Civil, vol. 84, no. 22, May 31, 1924, pp. 513-516, 7 figs. Traveling cranes for transportation of sugar in sacks.

Monorail Traveling Crane. Min. & Oil Bul., vol. 10, no. 7, July 1924, pp. 717-719, 2 figs. Describes overhead crane and monorail system located at plant of Chanslor-Canfield Mirway Oil Co. Crane requires only half usual amount of trackage and makes transfer of large and heavy articles such as beams, pipes, lathes and engines, very simple.

1½-Ton Electric Overhead Traveling Crane with Underslung Bridge. Engineering, vol. 118, no. 3057, Aug. 1, 1924, pp. 164-166, 2 figs. Details of crane built by J. Adamson & Co., Hyde, Eng., with underslung bridge for transferring goods from barges on one side of workship into store sheds on other without traveling longitudinally.

Standard Traveling Cranes (Normale Dampfkrane), W. Benedict. Maschinenbau, vol. 3, no. 16, May 22, 1924, pp. 576-577, 1 fig. Discusses construction of steam slewing cranes, especially control services; adaptability for many purposes.

Traveling Jib. The Minimum Necessary Total Weight and the Lowest Possible Wheel Load of Traveling Jib Cranes (Svängkranars minsta erforderliga totalvikt och lägsta möjliga hjultryck), J. Björklund. Teknisk Tidskrift, vol. 54, no. 38, Sept. 20, 1924, pp. 97-105 (Mekanik), 9 figs. Analytical methods are applied to principal designs of such cranes and comparatively simple formulas are evolved for minimum total weight and load on wheels of car track.

Unloading. Hoisting Apparatus. Electric Unloading Cranes (Note sur l'étude des appareils de levage. Grues de dechargement à moteurs électriques), G. Catella. Arts et Métiers, vol. 77, no. 45, June 1924, pp. 220-227, 17 figs. Discusses choice of electric motor, calculation of power required, calculation of frame, and stability of crane.

Unloading Plant of the New United Sugar Company at Ham (Somme) [L'installation de déchargement de la Compagnie nouvelle de Sucreries réunies, à Ham (Somme)], C. Dantin. Génie Civil, vol. 85, no. 9, Aug. 30, 1924, pp. 185-189, 7 figs. Details of design and operation of portal gantry and cranes for handling sugar beet; electric drive.

Uses. Industrial Cranes and Their Varied Uses, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 67, no. 4, Apr. 1924, pp. 216-223, 12 figs. Discusses different ways in which cranes can be of service; classifications for cranes.

Wharf. See Electric; Quay.

CRANKCASES

Aluminum, Molding. Central European Practice, C. Irresberger. Foundry, vol. 52, no. 7, Apr. 1, 1924, pp. 258-262, 15 figs. Aluminum crankcases molded with chills and lugs to neutralize shrinkage effects; molding practice; castings cleaned by sand blast and tested for porosity by brushing with gasoline.

Jigs and Fixtures for. Jigs and Fixtures for Small Crankcases, A. J. Aires. Am. Mach., vol. 60, no. 5, Jan. 31, 1924, pp. 167-170, 9 figs. Locating crankcase from four-bolt holes; centering case from center and end bearings; special sleeves for supporting crankcase walls while broaching and burnishing.

CRANKS

Multi-Throw, Welding. See WELDING, Multi-Throw Crank.

CRANKSHAFTS

Automobile. See DROP FORGING, Crankshafts.

Balancing. Practical Balancing of a V-Type Engine Crankshaft, D. E. Anderson. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 409-414, 10 figs. Practical methods devised to accomplish results desired; describes how selection of parts to obtain equal weights is made; combination static and dynamic balancing machine that can be set for either operation is used for balancing crankshaft; method of testing completed work.

Elastic Couplings, Influence of. Influence of Harmonics of Phase Retardation on Arrangement of Cranks in a Multiple-Cylinder Explosion Engine (Influence des harmoniques des retards de phase sur la répartition des manivelles dans un moteur à explosion à cylindres multiples), A. Blondel. Académie des Sciences—Comptes Rendue, vol. 178, no. 4, Jan. 21, 1924, pp. 354-359. Investigation of influence of elastic couplings and damping; it is shown that use of elastic couplings necessitates closer examination of conditions of resonance and damping of multiple crankshafts.

Explosion-Engine, Resonance of. Experimental Demonstration and Exact Measurement of Resonance of Crankshafts of Explosion Engines; Rôle of Flywheel; Favorable Effects of Elastic Coupling (Démonstration expérimentale et mesure précise des phénomènes de résonance propre des arbres-manivelles des moteurs à explosion; rôle du volant; influence favorable d'un accouplement élastique), A. Blondel and H. Harle. Académie des Sciences—Comptes Rendus des Séances, vol. 178, no. 18, Apr. 28, 1924, pp. 1442-1452, 4 figs. Gives results of experiments to measure resonance in crankshafts at various speeds; compares results with theory.

Failures. Crankshaft Failures on Gas and Oil Engines, E. Ingham. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 719-720. Testing for alignment; Wöhler's experiments on fatigue of metals; brittleness in crankshafts; points out that failure is rarely sudden, and shaft should be examined frequently for signs of fracture.

Stress Distribution in Crankshafts and Its Relation to Crankshaft Failures, D. J. McAdam, Jr. and G. F. Wohlgemuth. Am. Soc. Naval Engrs.—Jl., vol. 36, no. 2, May 1924, pp. 244-281, 29 figs. Causes of crankshaft failures; stress distribution in crankshafts as affected by restraint of journals; stress-strain relationship in typical naval crankshafts; measured and calculated angular deflections of Liberty crankshaft; typical crankshaft failures; desirable stress distribution in crankshafts.

Forging. The Forging of Automobile Crankshafts, J. H. Nelson. Forging—Stamping—Heat Treating, vol. 10, no. 9, Sept. 1924, pp. 312-317, 7 figs. Automobile manufacturers are demanding crankshaft forgings that require least amount of machining and which will give nearly perfect dynamic balance. Description of inspection methods necessary to secure best of material and produce desired results. Discusses forging and heat treatment.

Gas-Engine. The Crankshaft of Gas Engines (Die Kurbelwelle der Gasmotoren), H. and W. Haeder. Motor u. Auto, vol. 21, no. 2, Jan. 25, 1924, pp. 9-14, 56 figs. Aspects governing design; bearings; diameter condition with regard to cylinder bore; main dimensions; lubrication.

Machining. Machining Automobile Crankshafts, W. E. Groene. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 855-858, 4 figs. New manufacturing method involving use of automatic crankshaft lathe in conjunction with multi-cut lathe.

Motorcycle. Manufacturing a Motor Cycle Crankshaft. Eng. Production, vol. 7, no. 143, Aug. 1924, pp. 244-247, 22 figs. Detailed consideration of operation, layout and tooling equipment.

Repairing. See ELECTRIC WELDING, Precision.

CRATES. See PACKING, Crate Design.

CREAMERIES. See DAIRIES.

CREMATORIES

Furnaces. Heat Economics in Crematories (Wärmewirtschaft in Krematorien), Fichtl. Wärme, vol. 47, no. 34, Aug. 22, 1924, pp. 394-397, 5 figs. Types of furnaces; causes of high fuel consumption; improvements in heat economics; suggestions for better furnace construction.

CREOSOTE

Specification for. See RAILWAY TIES, Preservative Treatment.

CRUISERS. See WARSHIPS, Cruisers.

CRUSHERS

Gyratory. Vickers' Gyratory Crusher at the British Empire Exhibition. Engineering, vol. 117, no. 3045, May 9, 1924, p. 606, 2 figs. Designed to meet demands for strong and durable machine capable of crushing large quantities of rock, ore and stone used for road metal, railway ballast, and in concrete.

Types. Crushing and Grinding, S. G. Ure. Chem. & Industry, vol. 43, no. 47, Nov. 21, 1924, pp. 1145-1152, 10 figs. Jaw, disk and gyratory crushers.

Crushing Machinery, Kuhr. Eng. Progress, vol. 5, no. 3, Mar. 1924, pp. 47-49, 1 fig. Deals with crushers used for breaking up and pulverizing hard material, which work especially favorably.

CRUSHING

Ore-Crushing Plant. United Verde Completes Model Crushing Plant, G. J. Young. Eng. & Min. Jl.—Press, vol. 117, no. 10, Mar. 8, 1924, pp. 396-400, 12 figs. Describes new crushing plant of United Verde Copper Co. at Clarksdale, Ariz., designed to receive mine-run or both from underground operations and steam-shovel workings and to crush to various sizes, ranging from a maximum of 2½ to 3½ in. to pass a ¼-in. screen. Dust-collecting system a feature.

CRYOLITE. See FLUORSPAR.

CRYSTALS

Atomic Structure. The Atomic Structure of Deformed Crystals in Their Relation to Stiffening Process (Die atomistische Struktur deformierter Kristalle in ihrer Beziehung zu den Verfestigungsvorgängen), R. Gross. Zeit. für Metallkunde, vol. 16, no. 1, Jan. 1924, pp. 18-23, 14 figs. Results of tests with elastic and plastic deformation of mineral-salt and mica plates and their analogy to metallic crystals.

Carbon Atom in. The Carbon Atom in Crystalline Structure, Wm. H. Bragg. Franklin Inst.—Jl., vol. 198, no. 5, Nov. 1924, pp. 615-625. Observations of behavior of long-chain molecules seem to point to conclusion that carbon atom in chain, like carbon atom in diamond atom, is possessed of four points of attachment regularly disposed about

it, and that non-use of one does not alter disposition of others.

Deformation. The Strengthening of Crystals from the Standpoint of X-Ray Research (Die Verfestigungsfrage vom Standpunkt der Röntgenforschung), E. Schiebold. Zeit. für Metallkunde, vol. 16, nos. 11 and 12, Nov. and Dec. 1924, pp. 417-425 and 462-481, 34 figs. The mechanism of deformation of crystalline media and its identification in X-ray photograph. Bibliography.

Form and Lattice. On the Crystal Form and the Crystal Lattice, M. Yamada. Tôhoku Imperial University—Sci. Reports, vol. 13, no. 1, Oct. 1924, pp. 53-74, 21 figs. Calculates surface energy for few simple cases by assuming simple laws as to atomic action, and attempts to ascertain whether crystal forms and planes of cleavage theoretically found correspond to those which actually occur.

Gravitational Anisotropy in. Gravitational Anisotropy in Crystals, P. R. Heyl. U. S. Bur. Standards—Scientific Papers, no. 482, Feb. 16, 1924, pp. 307-324, 8 figs., partly on supp. plates. Details of experiments made to test whether, in a crystal of one of the nonisometric systems, gravitation will be found to align itself with inertia or will show some variability which will classify it with the great majority of physical phenomena.

Metallic, Etching of Hollow. Etching of Hollow Metallic Crystals (Ueber die beim Anätzen krummflächiger und hohler Metallkristalle auftretenden Körperformen), R. Gross, F. Koref and K. Moers. Zeit. für Physik, vol. 22, no. 5, Mar. 28, 1924, pp. 317-321. A study of faces developed on interior and exterior of hollow tungsten cylinder by etching with alkaline potassium ferricyanide solution.

Recrystallization. Observing the Recrystallization Process by Means of X-Rays (Beobachtungen des Rekristallisationsvorganges mittels Röntgenstrahlen), R. Glocker and E. Kaupp. Zeit. für Metallkunde, vol. 16, no. 10, Oct. 1924, pp. 377-379, 9 figs., partly on supp. plate. Discusses recrystallization tests with rolled silver sheets, showing presence of layers of crystallite at low temperatures which at high temperatures is distributed irregularly.

Strengthening and Recrystallization (Verfestigung und Rekristallisation), R. Gross. Zeit. für Metallkunde, vol. 16, no. 9, Sept. 1924, pp. 344-352, 22 figs. Author attempts to refer deformations of crystal to system based on slip planes formed in crystal, direction of slip, and axis, perpendicular to direction about which lattice can be bent; experiments on bending of rock-salt rods confirm author's previous assumption of strengthening through action of slip planes; effect of crystal surface on strength of rods is investigated and it was found that bending strength depends on inner constitution of crystal, not on surfaces.

Silicon-Steel. A Study of the Joule Magnetostrictive Effect in Silicon Steel Crystals, S. R. Williams. Testing, vol. 1, no. 3, Mar. 1924, pp. 190-193, 3 figs. Results of measurement of changes in length of individual silicon steel crystals when subjected to magnetic fields varying continuously from zero up to two thousand gauss.

Single-Metal. Some Properties of Single Metal Crystals, P. W. Bridgman. Nat. Acad. Sciences—Proc., vol. 10, no. 10, Oct. 1924, pp. 411-415. Results of measurements of number of physical properties of single crystals of more readily obtainable non-cubic metals, Zn, Cd, Bi, Sb, Te and Sn.

Structure. The Crystalline Structure of Organic Substances, W. H. Bragg. Engineering, vol. 117, nos. 3033, 3034, 3035, and 3036, Feb. 15, 22, 29, and Mar. 7, 1924, pp. 211-212, 244-245, 274-275, and 310-311, 22 figs. Feb. 15: Deals with first principles of X-ray analysis. Feb. 22: Reflection of X-rays from planes occupied by atoms in crystal; object of X-ray analysis. Feb. 29: Help of X-ray in finding out internal constitution of crystal. Mar. 7: Comments on long open chain organic molecules; the three types of chemical bonds.

Surface Energy. On the Surface Energy of Crystals and Crystal Forms, M. Yamada. Tôhoku Imperial University—Sci. Reports, vol. 13, no. 1, Oct. 1924, pp. 27-51, 15 figs. Method of extension of Born's and Stern's calculation of surface energy; by applying this method to crystals in general, polyhedral forms of crystals and law of rationality is explained by mutual action of atoms; gives reasonable explanation of cleavage.

Thermal-Expansion Coefficient. On the Thermal Expansion Coefficient of Crystalline Substances, Y. Endo. Tokyo Imperial Univ., Aeronautical Research Inst.—Report, vol. 1, no. 9, Nov. 1924, pp. 225-246, 4 figs. Elucidates mechanism of thermal expansion of crystalline substances and its variation on ground of M. Born and A. Landé's ionic lattice theory and quantum theory.

X-Ray Analysis. Application of X-Ray Crystal Analysis to Metallurgy, W. P. Davey. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 375-392, 6 figs. Outlines methods used in applying X-ray crystal analysis to metallurgy and gives outstanding results so far obtained; figures illustrating atom arrangements and diagram of method used in obtaining X-ray spectroscopic photographs.

Crystal Analysis by the Diffraction of X-Rays, R. A. Patterson. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 689-691, 6 figs. Describes Hull's method of applying X-ray diffraction to analysis of crystals, especially those of metals. Illustration of method applied to copper and copper-manganese alloy.

Study of Crystal Structure and Its Applications, W. P. Davey. Gen. Elec. Rev., vol. 27, nos. 11 and 12, Nov. and Dec. 1924, pp. 742-748 and 795-802, 10 figs. Nov.: Theory of diffraction of X-rays by a crystal. Dec.: Crystal lattices.

The Analysis of Crystal Structure by X-Rays, W. H. Bragg. Chem. & Industry, vol. 43, no. 39, Sept. 26, 1924, pp. 954-963, 9 figs. Consideration of new methods of analyzing structure of materials by means of X-rays, with special regard to stages by which they move toward their objective.

The Application of X-Ray Crystal Analysis to Metallurgy, E. C. Bain. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 692-698, 13 figs. Describes utilization of Hull or Debye and Sherrer method for atomic arrangement for study of metallurgic problems.

Zinc and Cadmium. Investigation of Metal Crystals (Untersuchungen an Metallkristallen), E. Grüneisen and E. Goens. Zeit. für Physik, vol. 26, no. 4-5, Aug. 14, 1924, pp. 235-249, 3 figs. Determination of elastic constants of zinc and cadmium and their specific heat and electric resistance.

CULVERTS

Corrugated-Iron. Corrugated Culverts on the Western Pacific, C. P. Gilmore. Eng. & Contracting (Railways), vol. 62, no. 4, Oct. 15, 1924, pp. 875-878, 3 figs. Twelve years' experience in replacement of wooden structures through high and low fills. Costs of installation.

How One Railroad Replaces Trestles with Corrugated Pipe, R. E. Caudle. Ry. Eng. & Maintenance, vol. 20, no. 1, Jan. 1924, pp. 19-20, 3 figs. Points out advantages of this type of culvert, and

gives comparative costs of concrete, cast-iron, and corrugated culverts.

Is the Corrugated Iron Culvert Adapted to Railroad Use?, W. S. Lacher. Ry. Eng. & Maintenance, vol. 20, no. 6, June 1924, pp. 224-230, 12 figs. Study of problem based on behavior of 10,000 installations in service up to 16 years.

Part Circle Corrugated Culverts in City Drainage. Eng. & Contracting (Roads & Streets), vol. 62, no. 3, Sept. 3, 1924, pp. 499-502, 8 figs. Details of installations in California cities showing application of system at street intersections and other points of small clearance.

Roads Use Corrugated Culverts Under Fills. Ry. Age, vol. 76, no. 27, June 7, 1924, pp. 1359-1363, 5 figs. Study of many installations in service up to 16 years indicates satisfactory service.

Solving the Small Bridge Problem with Large-Diameter Corrugated Iron Pipe, H. B. Kenny. Good Roads, vol. 67, no. 3, Sept. 1924, pp. 83-84, 2 figs. Discusses installation of large-diameter corrugated iron culverts, and methods employed.

Entrance Loss, Reduction of. Shape of Entrance Affects Flow Through Culvert Pipe. Ry. Eng. & Maintenance, vol. 20, no. 5, May 1924, pp. 196-198, 2 figs. Methods of reducing entrance loss; discharge a function of sq. ft. of head for full culvert; results of tests carried out by Univ. of Iowa and U. S. Bur. Pub. Roads.

Highway. See BRIDGES, HIGHWAY, Design.

Mexico. The Culvert System in the Town of Vera Cruz and Its Inconveniences (El sistema de atarjeas en la ciudad de Vera Cruz y sus inconvenientes), M. A. deQuevedo. Revista Mexicana de Ingenieria y Arquitectura, vol. 2, no. 8, Aug. 15, 1924, pp. 429-448, 1 fig., partly on supp. plate. Discusses bases of system constructed by S. Pearson & Son, its drawbacks and additional construction work necessary to put sanitary conditions in satisfactory state.

Replacing by Tunneling. Replacing a Culvert by Tunneling, F. H. Cramer. Ry. Eng. & Maintenance, vol. 20, no. 5, May 1924, pp. 183-186, 8 figs. Unique methods of driving and backfilling result in economical completion of difficult work.

CUPOLAS

Blast Controlling and Recording. Controlling and Recording the Cupola Blast. Can. Foundryman, vol. 15, no. 12, Dec. 1924, pp. 18-19 and 34, 4 figs. Points out that blast pressure is of little value without knowledge of volume; and describes pressure volume recorder which records pressure and volume.

Charge Calculation. Method and Example of Calculating Charges (Schema und Beispiel einer Gattierungsberechnung), B. Osann. Giesserei-Zeitung, vol. 21, no. 15, Aug. 1, 1924, pp. 317-319. Discusses chemical composition of castings, quantity of charge for 100 kg. finished castings, calculation of S content giving quantity of pig, calculates charge on basis of P content, followed by Mn and Si content, etc.

Charging. Mechanical Charging for a Foundry Cupola. Iron Age., vol. 114, no. 22, Nov. 27, 1924, pp. 1397-1398, 3 figs. More uniform mixing and better iron are secured; hydraulic core remover cuts costs of cleaning castings.

Control Records. Records Show Cupola Control, S. J. Pelton. Foundry, vol. 52, no. 7, Apr. 1, 1924, pp. 255-257, 6 figs. Constant personal check must be kept on materials and methods, otherwise records are liable to have little value; scales and weighing methods require particular attention.

Design and Practice. General Cupola Design and Practice, A. Campion. Foundry Trade Jl., vol. 30, no. 432, Nov. 27, 1924, pp. 455-458. Requirements for efficient working; factors in design; cupola output; charging the cupola; heat development and melting.

Experimental Results. The Dimensions of Cupolas, Their Relation to Volume of Coke and Iron Charges and Their Influence on Melting Process and Coke Consumption (Die Abmessungen der Kuppelöfen, ihr Verhältnis zur Grösse der Koks- und Eisensätze und ihr Einfluss auf Schmelzgang und Koksverbrauch), A. Wagner. Stahl u. Eisen, vol. 44, no. 22, May 29, 1924, pp. 617-622, 1 fig. Results of experiments on two larger cupolas and one smaller one.

Fuel Economy. Economical Melting with Cupolas, H. Van. Aarst. Foundry Trade Jl., vol. 29, no. 409, June 19, 1924, pp. 522-524, 3 figs. See also Foundry, vol. 52, no. 13, July 1, 1924, pp. 514-515, 3 figs. How to be economical with fuel in cupola. Influence of iron on fuel economy, influence of mechanical properties of coke, air supply, and cupola linings.

Iron Melting in. Twin Cupolas Melt Wheel Iron, P. Dwyer. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 287-293 and 322, 10 figs. Describes new process introduced in Albany plant of Albany Car Wheel Co., consisting in melting iron in twin cupolas, allowing it to collect in central chamber and tapping it therefrom into mixing ladle; to insure continuous operation, two pairs of cupolas have been installed.

Operation. Calculations for Cupola Furnace Operation (Berechnungen für den Kupolofenbetrieb). Zeit. für die Gesamte Giessererpraxis, vol. 45, nos. 29, 30, 33, and 34, July 20, 27, Aug. 17 and 24, 1924, pp. 209-210, 217-219, 242-243, and 250-252. Discusses furnace dimensions, quantity of air of combustion and of gases, and makes calculations for increasing or decreasing charges, etc.

Practice. A Day at the Cupola, A. R. Bartlett. Foundry Trade Jl., vol. 29, no. 389, Jan. 31, 1924, pp. 89-92, and (discussion), Feb. 7, 1924, pp. 113-116, 1 fig. Describes operations of a day at cupola of foundry with which author is connected.

See also IRON FOUNDING, Practice.

Schuermann. Blast Preheated in New Cupola. Iron Trade Rev., vol. 74, no. 5, Jan. 31, 1924, pp. 353-355, 3 figs. Arrangement of refractory brick checkerwork conserves heat in cupola invented by E. Schürmann, Dresden, Germany; blast passes transversely across cupola melting zone; pressure and exhaust fans used; substantial saving in coke consumption claimed.

Comparative Melting Tests in a Standard Cupola and a Schürmann Furnace of the Same Overall Dimensions, E. Piwowarsky and N. Broglio. Foundry Trade Jl., vol. 30, no. 425, Oct. 9, 1924, pp. 305-310, 8 figs. Results show that Schürmann furnace has 30 per cent higher thermal efficiency, and mechanical properties of Schürmann-furnace iron are better.

Cupola Furnaces (Die Kupolöfen), L. Bolzani. Praktische Maschinen-Konstrukteur, vol. 57, no. 29, Aug. 5, 1924, pp. 411-412, 4 figs. Summary of development and functions of cupola furnaces; describes Schürmann furnace working with preheated air.

Slagging Operations. Slagging Operations in Cupola Practice, H. H. Shepherd. Metal Industry (Lond.), vol. 24, nos. 11 and 12, Mar. 14 and 21, 1924, pp. 259-261 and 283-284. Object of slagging; slagging reactions; amounts of flux to use; composition of good limestone for fluxing; sulphur absorption; cupola slags.

Thermal Principles. The Thermal Principles of the Cupola Furnace (Die wärmetechnische Grundlage des Kupolofens), E. Diepschlag. Zeit.

für die gesamte Giessereipraxis, vol. 45, no. 41, Oct. 12, 1924, pp. 321-323, 5 figs. Coke consumption should not exceed 6 per cent of charge, and care should be taken to have melting occur at proper temperature, too much coke and too high temperatures being injurious to cast iron.

Tilting Device. Tilting Device Has Advantages on Small Cupola. Can. Foundryman, vol. 15, no. 3, Mar. 1924, p. 16, 1 fig. Shell hung on trunnions for convenience in preparing instead of workman getting inside.

Waste Utilization. Operating Experience with the Gray-Iron and Coke-Recovery Machine (Betriebserfahrungen mit der Graueschen Eisen- und Koks-Rückgewinnungsmaschine), M. Kupper. Giesserei Zeitung, vol. 21, no. 11, June 1, 1924, pp. 223-225. Discusses possible applications of machine, results of operations, profit and loss. Describes tests with cupola-furnace, foundry and other wastes.

CURVES

Construction. The Plotting of Observations on Curves and Analysis of the Curves, G. B. Upton. Sibley Jl. of Eng., vol. 38, no. 7, Oct. 1924, pp. 168-172 and 185, 15 figs. Discusses superiority of graphic presentation, preference of curves to tabular matter, types of curves, expressing data in curves, plotting and fairing, etc.

Electrical Three-Dimensional. Electrical Diagrams in Three Dimensions (Darstellung elektrischer Beziehungen im Raumdiagramm), J. Wotschke. Elektrotechnische Zeit., vol. 45, no. 21, May 22, 1924, pp. 528-529, 3 figs. Describes uses to which diagrammatic curves in three dimensions, on principles of solid geometry, can be put for purpose of explaining graphically certain electrical phenomena, such as efficiency of synchronous generator, which is variable, depending both on power factor and output.

Fitting. The Development of a Frequency Function and Some Comments of Curve Fitting, E. B. Wilson. Nat. Acad. Sci.—Proc., vol. 10, no 2, Feb. 1924, pp. 79-84, 2 figs. Author describes method of determining his own fit which, he claims, has desirable characteristic that it suggests at once a working hypothesis.

Hyperbolic. Plotting Hyperbolic Transformation Curves (Note sur le tracé des courbes hyperboliques de transformation, dans le diagramme). Arts et Métiers, vol. 77, no. 44, May 1924, pp. 170-173, 3 figs. Discusses Brauer's curve showing volume and absolute pressure of gas varying in geometric progression; plotting of hyperbolic curves by means of logarithmic auxiliary curve.

CUTTING METALS

City Gas, Use of. Use of City Gas for Cutting Steel, J. H. Gumz. West. Machy. Wld., vol. 15, no. 3, Mar. 1924, pp. 85-87, 9 figs. Results of tests made to determine cost of city-gas cutting.

Electric-Arc Process. See CARS, Steel, Scrapping.

Hydrogen-Gas. Cutting Metal with Hydrogen Gas, W. H. L. Porth. Am. Welding Soc.—Jl., vol. 3, no. 3, Mar. 1924, pp. 15-18. Conditions important in connection with determining use of a fuel gas for cutting of metals. Equipment used for cutting with hydrogen as fuel gas, and details of operation.

Oxy-Acetylene Cutting. See OXY-ACETYLENE CUTTING.

Oxygas Machine. Oxygas Cutting-out Machine. Machy. (Lond.), vol. 25, no. 631, Oct. 30, 1924, pp. 153-154, 3 figs. Details of oxygen cutting machine using coal gas as combustible for providing initial and auxiliary heat.

Oxy-Hydrogen Cutting. Cutting Metals with Hydrogen Gas, H. W. L. Porth. Iron Age, vol. 113, no. 4, Jan. 24, 1924, p. 298. Equipment used and method of operating it; fields of usefulness enumerated. (Abstract.) Paper read before Gas Products Assn.

Problems. Report on the Present Status and Future Problems of the Art of Cutting and Forming Metals, C. A. Beckett. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 20-30 and 57, 5 figs. Report of new special research committee to foster research activity in this field. Notes on progress made to date in art of cutting metals; research problems; summary of research work on art of cutting metals.

Processes. Economics of Metal-Cutting Processes (Die Wirtschaftlichkeit der Trennverfahren), Kammerer and M. W. Gleich. Maschinenbau, vol. 3, no. 23, Sept. 11, 1924, pp. 863-865, 3 figs. Compares time and cost of cutting of various rolling-mill products by autogenous and Mars processes, showing advantages of latter, using a cutting disk.

Progress in. Foreign Progress in Cutting Metals, C. A. Beckett. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 618-624, 17 figs. Shows manner in which solutions of some of the problems presented have been attempted by foreign experimenters, referring more specifically to problems (1) development of a standard method for testing tool material and material to be cut, (2) development of a standard heat-treating method, and (3) development of methods for testing tool performance.

Tool-Steel Trials. See TOOL STEEL, Hardness and Cutting Trials.

CUTTING TOOLS

Cutting-Edge Formation. Proper Formation of Cutting Edge of Tools (Die richtige Ausbildung der Meiszelschneide und ihr wirtschaftlicher Einflusz auf die Arbeit in einem zeitgemäsz eingerichteten Hüttenwerke), H. J. Stoewer. Werkstattstechnik, vol. 18, nos. 18 and 19, Sept. 15 and Oct. 1, 1924, pp. 484-486 and 522-526, 11 figs. Discusses feeds and speeds; "Klopfstock" cutting edge of tools for axle-journal turning; lathes for wheel tires and disk wheels, shaft-turning lathes, and others.

Cutting Speeds. Cutting Speeds, Catlin. Eng. Production, vol. 7, no. 136, Jan. 1924, pp. 26-30, 15 figs. Consideration of speeds, type of machine, and tool to be used.

Lubrication. See LUBRICATION, Cutting Tools.

Overhang as Affecting Shop Costs. How the Overhang of Tools Affects Shop Costs, Chas. F. Henry. Am. Mach., vol. 60, no. 1, Jan. 3, 1924, pp. 17-19, 9 figs. Examples from modern railway shops that can apply elsewhere as well; preventing vibration lengthens life of tools.

Standardization. Standardization of Cutting Tools (Beitrag zur Normung der Schneidstähle), R. Nerrlich. Werkstattstechnik, vol. 18, no. 17, Sept. 1, 1924, pp. 463-466, 3 figs. Terminology of surfaces and angles of edge of cutting tools.

CYANIDES

Production by Nitrogen Fixation. Cyanides and Chemical Engineering, H. G. Chickering. Chem. & Met. Eng., vol. 31, no. 25, Dec. 22, 1924, pp. 967-970, 3 figs. Engineers of Du Pont Co. have worked out process for producing cyanides by nitrogen fixation.

CYLINDERS

Automobile-Engine. Building McLaughlin-Buick Six Cylinder Engines, A. Murphy and W. Eversley. Can. Machy., vol. 32, no. 20, Nov. 13, 1924, pp. 19-22, 9 figs. Describes use of precision tools in machining operations at Canadian

Products plant, Walkerville division of Gen. Motors of Canada.

Machining Cylinders for the Gray Motor, H. Campbell. Am. Mach., vol. 61, no. 17, Oct. 23, 1924, pp. 659-662, 10 figs. Departmental layout; routing of work with descriptions and illustrations of interesting operations; three-station cylinder fixture; multiple tapping machines; finish boring.

See also AUTOMOBILE ENGINES, Machining Parts; IRON CASTINGS, Automobile Cylinders.

Castings for. The Cylinder Problem, O. Smalley. Foundry Trade Jl., vol. 29, nos. 392, 393, and 394, Feb. 21, 28, and Mar. 6, 1924, pp. 147-151, 173-177, and 195-197, 26 figs. Cause and elimination of the commoner defects encountered in manufacture of cylinder castings.

Hollow, Stresses in. Stable Equilibrium Conditions of a Hollow Cylinder Under External Pressure (Conditions d'équilibre stable d'un cylindre creux soumis à une pression extérieure), P. Gentner. Revue Universelle des Mines, vol. 2 (series 7), no. 6, June 15, 1924, pp. 318-326, 3 figs. Mathematical discussion and calculation of stresses in tubes of infinite lengths (boiler tubes, etc.) and in thin wall tubes.

Locomotive, Machining. How the American Locomotive Company Machines Cylinders and Bushings, L. C. Morrow. Am. Mach., vol. 61, no. 18, Oct. 30, 1924, pp. 675-679, 15 figs. Laying out cylinders for boring and planing; machining operations; testing hydraulically; setting up and assembling cylinders; operations on cylinder and valve-chamber bushings.

See also LOCOMOTIVES, Cylinders, Machining.

Locomotive, Welding. Locomotive Cylinder Welding, J. S. Heaton. Welding Engr., vol. 9, no. 6, June 1924, pp. 24-25, 10 figs. Firepot made of front end netting greatly reduces cost of preheating cylinders; special preheating torch.

Lubricating Oils for. See LUBRICATING OILS, Cylinder.

Motorcycle. Making Motorcycle Cylinders. Foundry, vol. 52, no. 15, Aug. 1, 1924, pp. 589-590, 5 figs. Work is cast in two-or three-part molds; pouring effected in many different ways; special device used for stripping fins into pattern of cylinder barrel.

Motor Cycle Cylinders (La frabrication des cylindres de motocyclettes), J. Léonard), Fonderie Moderne, vol. 18, Mar. 5, 1924, pp. 45-59, 19 figs. Also Foundry Trade Jl., vol. 29, no. 400, Apr. 17, 1924, pp. 311-315, 16 figs. Discussion of production, including tolerances, hardness, composition recommended, designing desiderata, metal-pattern making, molding, ramming, sponginess, etc.

Oval, for Airplane Engines. The Oval Cylinders. Aeroplane, vol. 27, no. 23, Dec. 3, 1924, pp. 524 and 526. Deals with claims made on behalf of oval cylinder and whether it really has advantages over circular cylinder which are likely to justify its use; supposed to be particularly advantageous in case of radial air-cooled type of engine.

Rotating, Air Force in. See AERODYNAMICS, Rotating Cylinders, Tests of.

Rotating, Deformation in. Deformation of Axial Symmetry in Rotating Bodies (Achsensymmetrische Deformation von Umdrehungskörpern), A. Timpe. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 5, Oct. 1924, pp. 361-376, 3 figs. Discusses solid and hollow cylinders, and solid and annular disks, and calculates axial torsion during rotation.

Seamless Steel. See OXYGEN, Cylinders for, Manufacture.

D

DAIRIES

Waste Treatment and Disposal. Aeration Studies on Creamery Waste Purification, M. Levine, L. Soppeland and G. W. Burke. Iowa State College of Agriculture & Mechanic Arts, vol. 22, no. 10, Aug. 8, 1923, 39 pp. Experiments undertaken to obtain information on principles of purification of dairy wastes; compares treatment of sewage and dairy waste; concludes that rapid elimination of acid constituents must come first in treatment of creamery waste.

The Treatment and Disposal of Dairy Wastes, Chas. L. Walker. Cornell Civ. Engr., vol. 32, no. 9, May 1924, pp. 112, 121, and VII. Summary of conclusions drawn from investigation in which sanitary engineer was of service to dairyman.

DAMS

Alcona, Mich. Alcona Dam on AuSable River, Wm. W. Tefft. Power, vol. 59, no. 6, Feb. 5, 1924, pp. 212-214, 4 figs. Two-unit 8000-kw. plant operating under head of 41 ft. max. ability at min. cost; features of interest are cubical design of plant with conduit spillway beneath power house, thin reinforced-concrete corewall, construction methods enforced by presence of quicksand, casting of steel-reinforced papier-mache conduit forms, etc.

Arch. Calculation of Cylindrical Envelopes Subjected to Thermic Stress. Application to the Calculation of Arched Dams (Calcul des enveloppes cylindriques soumises à des effets thermiques. Application au calcul des barrages-voûtes), A. Haegelen. Génie Civil, vol. 85, no. 3, July 19, 1924, pp. 62-65, 8 figs. Discusses general method for calculation, including general equations of elastic equilibrium, calculation of variations in temperature, application to dams.

High Arch Type Dam Built in Southern Spain, M. E. Wegenstein. Eng. News-Rec., vol. 93, no. 4, July 24, 1924, pp. 128-130, 5 figs. Describes concrete dam of Montejaque hydroelectric project, on Gaduares River in Andalusian Mountains; construction details; American methods and equipment used; crushed rock and sand quarried and prepared at site; two types of form used.

Recent Swedish Arch Dam Design, Bo Hellström. Engineering, vol. 118, no. 3054, July 11, 1924, p. 76. Notes on design of some recently-constructed Swedish concrete arch dams, and calculations involved. Paper, abridged, contributed to World Power Conference.

The Calculation of Dams with Relieving Arches (Zur Berechnung von Staumauern in Sparbauweise), F. Gebauer. Beton u. Eisen, vol. 23, no. 19, Oct. 5, 1924, pp. 258-260, 2 figs. Static calculation to demonstrate stress conditions in this type of arched dams.

See also Hartebeestpoort; Multiple-Arch.

Barrage. From the Gouffre d'Enfer Dam to the Camarasa Dam (Dalla diga di Gouffre d'Enfer a quella di Camarassa), F. Pagliaro. Ingegneria, vol. 3, no. 9, Sept. 1, 1924, pp. 298-305, 11 figs. Discusses hydroelectric plants of Barcelona Traction Light & Power Co. and St. Etienne; comparison of barrage dams and their design aid calculation.

Geologico-Constructive Study of Artificial Lake Barrage Dam and Pressure Conduit (Saggio di

investigazioni geognostico-costruttive applicate allo studio di un bacino imbrifero alpino e dei relativi: Sbarramento e canale di derivazione in pressione), C. Segré. Annali dei Lavori Pubblici, vol. 62, no. 6, July 1924, pp. 537-581. Discusses geological and hydrographical conditions, reservoir pressure conduit and barrage dam construction, etc.

The Sennar Dam on the Blue Nile (Le barrage de Sennar, sur le Nil Bleu). Génie Civil, vol. 85, no. 22, Nov. 29, 1924, pp. 500-503, 9 figs. Discusses irrigation of Gezira plain in Upper Egypt. Design and construction of Sennar dam.

See also Failures; HYDROELECTRIC PLANTS, France.

Building Materials, Investigation of. Investigations in Connection with the Construction of the Barberine Dam (Verschiedene Untersuchungen beim Bau der Staumauer Barberine), Eggenberger. Bauingenieur, vol. 5, no. 7, Apr. 15, 1924, pp. 189-193, 8 figs. Dam situated in valley of Trient River, Switzerland, has volume of 200,000 cu. m., is gravity type with triangular cross-section, and has height of 80 m. above foundation; investigation of building materials.

Concrete. Building Black Canyon Irrigation Dam in Western Idaho, W. Ward. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 818-823, 5 figs. Concrete dam of 184-ft. max. height built by Bur. of Reclamation to save private irrigation district; water level controlled by drum gates; concrete proportioned by Abrams method.

Concrete Dam at Sturgeon Falls Built During Temperatures as Low as 50 Below Zero, Geo. H. Kohl. Con. Rec. and Eng. Rev., vol. 38, no. 25, June 18, 1924, pp. 614-617, 5 figs. Interesting construction procedure on dam built by Spanish River Pulp & Paper Mills, Ltd. Describes plant and methods and gives outline of design.

Concrete Work at Wilson Dam, Muscle Shoals, R. P. Brown. Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 61-66, 6 figs. Construction features of largest concrete project in world.

Large Concrete Dam to Be Built at American Falls. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 741-742, 2 figs. Designs out for bids call for gravity overfall dam in gorge with non-automatic radial crest gates.

Laurel Road Dam, F. W. Skinner. Eng. Wld., vol. 24, no. 3, Mar. 1924, pp. 147-151, 9 figs. Construction details of $600,000 dam just completed for Stamford Water Co., across Mill River stream and valley, about 9 miles from Stamford, Conn., to impound about 2¼ billions gallons water in a 285-acre reservoir; is of gravity section.

Observations of Concrete and Reinforced-Concrete Works During a Trip of Investigation (Beobachtungen an Beton- und Eisenbetonbauten auf einer Studienreise), E. Probst. Bauingenieur, vol. 5, nos. 22, 23, and 24, Nov. 25, Dec. 10 and 25, 1924, pp. 721-728, 765-772, and 801-809, 23 figs. Discusses findings of Glenco inquiry; design and construction of Tirso barrage dam in Sardinia, and Belice barrage dam near Palermo; experience with cast concrete in barrage dam work; standards of bridges for Italian railways.

Progress in the Construction of Reinforced-Concrete Barrages (Fortschritte im Bau von Eisenbeton-Sperrmauern), O. Skall. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 45-46, Nov. 14, 1924, pp. 391-392. Development of Saliger dams, of arches between triangular piers and Ambursen types; proposals for reducing volume of dams and cost of construction; Vogt system of vertical circular cylinders.

Tensile Reinforcement in Concrete Dams, J. B. Macphail. Eng. Jl., vol. 7, no. 4, Apr. 1924, pp. 200-201, 3 figs. Proposed method for determining amount of reinforcement required.

The Construction of Loch Raven Dam, W. A. Megraw. Am. Water Wks. Assn.—Jl., vol. 11, no. 2, Mar. 1924, pp. 434-445, 6 figs. Description of concrete dam which is being constructed on Gunpowder river, in connection with improvements being made in Baltimore's water supply, to impound 23,000,000,000 gal. water; length, 640 ft. overall. Construction details.

The Lake Mentz Dam on Sundays River. Engineer, vol. 137, no. 3553, Feb. 1, 1924, pp. 116-117, 3 figs. partly on p. 122. Scheme carried out by Sundays River Irrigation Board 90 miles north of Port Elizabeth, South Africa; dam consists of massive reinforced-concrete structure, at one end of which are suspended five free-roller steel sluice gates, each 30 ft. wide by 25 ft. deep.

Wilson Dam at Muscle Shoals, World's Greatest Hydraulic Development, H. L. Cooper. Universal Engr., vol. 40, no. 2, Aug. 1924, pp. 21-26, 8 figs. See also Nat. Engr., vol. 28, no. 8, Aug. 1924, pp. 388-391, 3 figs. At Tennessee River for production of electric power and improvement of navigation; details of power house equipment, 30,000 hp. turbines, 25,000 kva. generators, 60 cycle, three-phase 12,000 volt 100 r.p.m., etc.

See also Hartebeestpoort; CONCRETE CONSTRUCTION, Swiss Alps.

Construction. Cableways Handle Excavation and Fill on Wisconsin Dam. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 301-302, 3 figs. Particulars of new dam for Wausau Paper Mills Co., on Wisconsin River at Brokaw, Wis.; designed to develop approximately 4000 hp. under a 17-ft. head. Cofferdam excavated and concrete gravel delivered by one slackline cableway; two used to construct earth dike.

Construction of Dams, A. P. Davis. Engineering, vol. 138, no. 3065, Sept. 26, 1924, pp. 466-468. Summary of current practice, especially its departure from, or development of, former practice. Paper, abridged, contributed to Sec. B of World Power Conference.

Earth. Classification and Definition of Earth Dam Types, J. A. Holmes. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, p. 1102, 7 figs. Descriptions based on methods of construction and materials employed.

Emden. Dike Construction West of the Emden Outer Harbor (Eindeichungsarbeiten westlich vom Emder Aussenhafen), M. Gährs and M. Hinz. Bautechnik, vol. 2, no. 37, Aug. 29, 1924, pp. 397-402, 10 figs. Details of work of walling-in of Larrelt and Wybelsum sandbanks to reclaim land; construction of weir, etc.

Failures. Collapse of the Gleno Dam (Einsturz der Gleno-Talsperre), N. Kelen. Beton u. Eisen, vol. 23, no. 11, June 5, 1924, pp. 133-138, 10 figs. Detailed explanation based on personal investigation of causes of failure.

Details of the Failure of an Italian Multiple-Arch Dam. Eng. News-Rec., vol. 92, no. 5, Jan. 31, 1924, pp. 182-184, 10 figs. Disastrous break of reinforced-concrete structure on masonry base of gravity section; plans not approved and workmanship doubtful; base laid in lime mortar; superstructure concrete poor.

Expert Report on Causes of Failure of Dam at Gleno (Relazione peritale sopra le cause che hanno determinato la rovina della diga del pian di Gleno in Val di Scalve, Crollata la Mattina del 1 Dicembre 1923), G. Ganassini and A. Danusso. Annali dei Lavori Pubblici, vol. 62, no. 5, May 1924, pp. 405-458, 40 figs. partly on supp. plate. Very detailed examination of Gleno collapse giving as fundamental reason inadequate statics of wall at center of dam. See also

(translation). Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 213-215, 3 figs.

Failure of Gleno Dam Charged to Buttress Shear. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 486-488, 5 figs. Study by Swiss engineer finds cause in weakness of defective buttress concrete under shear and tension.

The Destruction of Dams (Ueber Zerstörung von Staudämmen), Ziegler. Zeit. für Bauwesen, vol. 73, no. 10-12, 1923, pp. 293-305, 44 figs. Review of numerous dam failures, mainly in America, and their causes.

The Failure of Gleno Dam, Italy (Der Talsperrenbruch in Val Gleno), A. Stucky. Schweizerische Bauzeitung, vol. 83, nos. 6 and 7, Feb. 9 and 16, 1924, pp. 63-67 and 74-76, 19 figs. Buttress shear is charged with primary responsibility for disastrous failure of dam in Upper Italy; concrete of buttresses appears to have been of such poor quality as to be incapable of resisting stresses; failure of base is stated to be not primary cause of disaster; dam, which was 250 m. long, was completed in Oct. 1923 and failure occurred on Dec. 1. See also article by Rothmund in Bauingenieur (vol. 5, no. 3, Feb. 15, 1924, pp. 59-63, 3 figs.), giving opinion of an Italian engineer on causes of disaster.

Gleno, Italy. See Failures.

Grassridge, South Africa. Grassridge Dam, A. J. Wells-Jones. S. African Irrigation Mag., vol. 3, no. 2, June 1924, pp. 63-70, 7 figs. Description of dam, which is an earthen structure with a concrete core carried up to five feet below crest level. Catchment area 1500 sq. mi., capacity 60,000 acre feet.

Gravity. A Method for the Dimensioning of Gravity Dams (Ueber ein Verfahren zur Dimensionierung von Gewicht-Staumauern), W. Kienast-Curti. Schweizerische Bauzeitung, vol. 83, no. 20, May 17, 1924, pp. 229-230, 4 figs. Describes methods being applied by Buss Corpn. in Basel, Switzerland, according to Gutzwiller cell system, described in previous issue of same journal.

Arching Not Effective in Slightly Arched Gravity Dams, B. F. Jakobsen. Eng. News-Rec., vol. 92, no. 24, June 12, 1924, pp. 1020-1022, 2 figs. Relatively small curvature may be harmful because of reduced stability; arch action cannot be counted on under such conditions; construction costs increased by arching.

New French Instructions for the Building of High Dams as Gravity Dams (Neue französische Instruktion zum Bau hoher Talsperren als Gewichtsmauern), A. Zeerleder. Schweizerische Bauzeitung, vol. 83, no. 16, Apr. 19, 1924, pp. 181-183. Rules and regulations issued by French Minister of Buildings in 1923.

Very High Gravity Dams (Barrages de grande hauteur résistant par leur propre poids). Annales des Ponts & Chaussées, vol. 93, no. 6, Nov.-Dec. 1923, pp. 289-353, 7 figs. Instructions for planning of projects and execution of work presented by French Minister of Pub. Works to chief engineers of roads and bridges. See also discussion of regulations by E. Suter in Bul. Technique de la Suisse Romande, vol. 50, nos. 20 and 22, Sept. 27 and Oct. 25, 1924, pp. 249-252 and 273-277, 7 figs.

Hartebeestpoort, S. Africa. Hartebeestpoort Irrigation Dam in South Africa. Eng. News-Rec., vol. 92, no. 23, June 5, 1924, pp. 981-982, 3 figs. Concrete arch dam 195 ft. high; one end in hill and other at abutment.

The Hartebeestpoort Dam. Engineer, vol. 137, no. 3557, Feb. 29, 1924, pp. 230-231, 6 figs. partly on p. 228. Particulars of concrete dam; contents of reservoir when full is 568 million cu. ft., and calculated volume impounded is 9846 million cu. ft.; height of crest level of waste weir is 140 ft. above river bed, and top of solid parapet wall is 22 ft. 9 in. above top of waste weir.

The Hartebeestpoort Dam. Engineering, vol. 117, no. 3037, Mar. 14, 1924, pp. 323-325, 15 figs. partly on p. 338. Construction details of concrete dam recently completed near Pretoria, S. Africa; main features of design are arch dam, and long spillway at right angles to direction of dam with spillway channel outside it spanned at one point by bridge carrying Pretoria-Rustenburg road.

The Hartebeestpoort Dam, Pretoria, South Africa. Eng. & Contracting (Water Works), vol. 61, no. 2, Feb. 1924, pp. 340-342, 2 figs.

Hydraulic-Fill. Building the Highest Hydraulic Fill Dam, A. C. Eaton. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 235-238, 5 figs. Major unit of New England power system, Davis Bridge development on Deerfield River, Vt.; dam is 200 ft. high; construction operations on dam.

Irrigation. See Concrete; Hartbeestpoort; Sennar.

Italy. Large Italian Dams (Les grands barrages-réservoirs italiens). Génie Civil, vol. 84, no. 20, May 17, 1924, pp. 475-477, 6 figs. Details of more important dams recently completed or under construction, based on report by C. Bonomi in Annali delle Utilizzazioni delle Acque.

See also Failures.

Masonry. Lines of Pressure in Masonry Dams, A. Van der Meersch. Ry. Engr., vol. 45, no. 537, Oct. 1924, pp. 349-350, 6 figs. Proposes solution which aims at greater simplicity in obtaining lines of pressure.

Movable. Hydraulic Movable Automatic Water Dam (Hydraulisch automatischwerkende "Dakstuw"), Huber en Lutz. Waterstaats Ingenieur, vol. 12, no. 1, Jan. 1924, pp. 3-9, 11 figs. Automatic arrangement which will dam up water so as to produce highest possible level for a hydraulic power plant under normal conditions, but will allow water to flow freely in case of a sudden flood. Numerous installations in Central Europe mentioned and design illustrated.

New Type Movable Dam Guards Soo Canal Locks, L. C. Sabin. Eng. News-Rec., vol. 93, no. 17, Oct. 23, 1924, pp. 656-660, 6 figs. Emergency structure insures service continuity to lock gates of St. Marys Falls canal, Mich.; bridges, wicket frames and needles handled by huge derricks.

Multiple-Arch. Multiple Arch Barrage Dams and Their Security (Les barrages à voutes multiples et la sécurité), E. Baticle. Génie Civil, vol. 85, no. 2, July 12, 1924, pp. 36-37. Criticises continued confidence in multiple-arch dams after Gleno failure and shows that dams do not give security theoretically that might be expected of them.

Reinforced Multi-Arch Dam Design Adopted by Swedish Engineers, Johnstone-Taylor. Concrete, vol. 24, no. 4, Apr. 1924, pp. 152-153, 6 figs. In connection with damming of Great Lule river in Lapland for water-power purposes, multiple-arch design constructed of reinforced concrete was decided upon as most economical. Particulars of structures, of which there are two, one having 23 arches and one 15 arches.

The Dam of the Vöhrenbach Power Plant (Germany) (Die Staumauer des Kraftwerkes Vöhrenbach), Fritz Maier. Beton u. Eisen, vol. 23, nos. 2 and 3, Jan. 20 and Feb. 5, 1924, pp. 13-18 and 25-28, 31 figs. Dam is of multiple-arch type, consisting of 12 arches with total span of 142-8 m. at crown; built of reinforced concrete; construction details and calculations.

The Tirso Dam, Sardinia. Engineering, vol. 118, no. 3071, Nov. 7, 1924, pp. 632-635, 15 figs.

partly on supp. plate. Project involves regulation of river and conservation of water for irrigation purposes, production of hydroelectric power, and drainage of large area to be served by irrigation; multiple-arch dam is said to be highest and most important example of its type to be built; it is 228 ft. from lowest foundation level to roadway level along top, and has series of 17 reinforced-concrete arches.

See also Concrete; HYDROELECTRIC DEVELOPMENTS, Tasmania.

Muscle Shoals. See Concrete.

Porous-Foundation, Repairing. Repairing the Laguna Dam on the Colorado, R. M. Priest. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 1002-1003, 6 figs. Work to restore 15-yr.-old porous-foundation weir after shortened channel undermines toe of dam.

Rock-Filled. The World's Highest Rock-Filled Dam, T. Marvin. Explosives Engr., vol. 2, no. 9, Sept. 1924, pp. 311-318 and 323, 18 figs. Construction work on dam being erected by Ky. Hydro-Electric Co. on Dix River. Blasting and transportation of 1,600,000 cu. yd. of rock are main factors.

Sand-Bottom Estuaries. Tidal Power Barrages in Sand Bottom Estuaries. Engineer, vol. 137, no. 3559, Mar. 14, 1924, p. 276, 1 fig. Construction developed by author to meet local conditions of estuaries of south and north coasts of Devon and Cornwall, with object of ascertaining actual cost.

Sennar, Africa. The Sennar Dam and the Gezira Irrigation Scheme. Engineer, vol. 138, no. 3587, Sept. 26, 1924, pp. 348-350, 12 figs. partly on supp. plate and p. 352. Particulars regarding construction of Sennar Dam, which is being built on Blue Nile to provide water for irrigation of Gezira Plain, which lies south of Khartoum, on tongue of land formed by confluence of Blue and White Niles. Total length about 9925 ft., and height from lowest point in foundations to top of parapet about 130 ft.

Sluices. Sluices in the Krishnarajasagara Dam, G. Seshagiri Rao. Mysore Engrs.' Assn.—Bul., vol. 2, no. 1, Jan.-Mar. 1924, pp. 1-21, 3 figs. Experiences with sluices already built in dam and general features of proposals for those to be installed.

Spillways. The Hydraulic Design of the Shaft Spillway for the Davis Bridge Dam, and Hydraulic Tests on Working Models. Am. Soc. Civ. Engrs.—Proc., vol. 50, nos. 5, 6, 7, and 9, May, Aug., Sept., and Nov. 1924, pp. 671-678, 852, 860, 1118-1123, and 1426-1435, 3 figs. Discussion of paper by F. Kurtz.

Walls. Sliding Safety of Dams (Die Gleitsicherheit der Staumauern), E. Link. Zeit. für Bauwesen, vol. 74, no. 4-6, 1924, pp. 34-37, 10 figs. Discusses dam construction on base plate, of triangular, rectangular, and compound profiles, and formulates rules for cases where shearing strength of rock cannot be relied upon.

Wilson. See Concrete.

Zuider Zee, Netherlands. The Closure of the Zuider Zee according to the Plan of Ten Bokkel Huinink (De afsluitdijk der Zuiderzee. Plan Ten Bokkel Huinink), M. J. Stam. Ingenieur, vol. 39, no. 9, Mar. 1, 1924, pp. 145-150, 8 figs. Description of a proposed design for a new dam.

DENSIMETERS

Selenium. See SELENIUM, Densimeter.

DENSITOMETERS. See PHOTOMETERS, Photoelectric.

DEPARTMENT STORES. See BUILDINGS, Department Stores, France.

DEPRECIATION

Machinery. See COST ACCOUNTING, Depreciation.

DEPTH FINDING. See SUBMARINE SIGNALING.

DERRICKS

Derrick Boat. See BARGES, Derrick.

Failures. N. Y. Building Bureau Reports on Three Derrick Failures. Eng. News-Rec., vol. 93, no. 7, Aug. 14, 1924, pp. 266-267, 2 figs. Inspectors' findings concerning collapses of June 25, July 28 and 31 show one only due to faulty equipment.

DIAGRAPH. See INTEGRATORS, Diagraph.

DIAMONDS

Drill, Brazil. Drill Diamonds, Carbons or Carmonados, Their Occurrence in Brazil, F. L. Garrison. Eng. & Min. Jl.-Press, vol. 118, no. 13, Sept. 27, 1924, pp. 491-495, 7 figs. Physical properties of carbons; data as to Brazilian diamond production scanty; value of gravels a matter of speculation; productive area limited; continued reduction of output seems inevitable.

Grinding Wheel Truing. See ABRASIVE WHEELS, Diamonds for Truing.

Industrial. How Industrial Diamonds Are Set, F. B. Wade. Abrasive Industry, vol. 5, no. 4, Apr. 1924, pp. 93-94. Properties of diamonds for wheel truing, and setting methods.

Industrial Diamonds, R. Shaw. Eng. Production, vol. 7, no. 142, July 1924, pp. 188-191, 6 figs. Use of diamond for truing and dressing abrasive wheels; kinds of diamonds employed; diamond dies.

Mounting Diamonds by Casting, H. Miller. Abrasive Industry, vol. 5, no. 1, Jan. 1924, pp. 1-2, 2 figs. Description of a practical method.

Minerals, Treatment of. Diamond Dressing in British South Africa (Die Aufbereitung der Diamanten in Britisch-Südafrika), Treptow. Metall u. Erz., vol. 21, no. 17, Sept. 1, 1924, pp. 397-401. Discusses kimberlite and other diamond minerals; development of treating processes, apparatus used, mechanical comminuting, etc., as practised at Kimberley.

Mining. Diamond Mining (Diamantengewinnung), H. Harbottle. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 32, Aug. 9, 1924, pp. 827-829, 6 figs. Describes shaft sinking and stripping operations at Kimberley and treatment in washing machines and pulsating plants.

Transformation in Vacuum. Transformation of Diamond in a Vacuum at High Temperatures (Sur la transformation du diamant dans le vide à haute température), P. Lebeau and M. Picon. Académie des Sciences—Comptes Rendus, vol. 179, no. 20, Nov. 17, 1924, pp. 1059-1061. When heated in high vacuum at 1500 to 1900 deg., transformation of diamond into graphite is comparatively slow, being incomplete after one hour, in marked contrast to rapid transformation in presence of gases; above 2000 deg. change is much more rapid, but swelling up and disintegration which occurs in presence of gases are not always observed.

Transformation into Graphite. Transformation of the Diamond (Sur une transformation du diamant), G. Friedel and G. Ribaud. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1126-1129. On heating a diamond to 1500 deg. cent. the surface is blackened; heating in oxidizing flame removes this surface layer, which contains only small proportion of graphite; above 1800 deg. transformation into graphite occurs, becoming more rapid as temperature rises;

above 1885 deg. substance may suddenly disintegrate into small fragments.

Truing, Mounting for. See AUTOMOBILES, Rear Axles, Machining.

DIATOMACEOUS EARTH. See EARTH, Diatomaceous; MOLER.

DIE CASTING

Aluminum. Die-Casting Aluminium, S. Swan. Metal Industry (Lond.), vol. 24, no. 6, Feb. 8, 1924, p. 123. Chief practical precautions that must be taken for successful casting of aluminum in permanent molds.

Die Casting with Special Reference to Latest Results in Aluminum Casting (Die Spritzgussfertigung unter Berücksichtigung der neuesten Ergebnisse auf dem Gebiete des Aluminumspritzgusses), B. Wollmann. Werkstatttechnik, vol. 18, no. 21, Nov. 1, 1924, pp. 620-625, 26 figs. Methods of Arndt & Co., Doehler-Guss Co., Acme Die-Casting Co., and others, and apparatus used.

Aluminum Alloys. See ALUMINUM ALLOYS, Die Casting.

Machines, Alloys, and Dies. Die Casting, N. C. Barnard. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 661-669, 23 figs. Types of die-casting machines; representative alloys for use in die casting; die construction; casting problems; advantages gained by use of inserts.

Process. Die-Casting Processes (Die Spritzguss-Verfahren). Zeit. für die Gesamte Giessereipraxis, vol. 45, nos. 18, 19, 20, 21, 22, and 23, May 3, 10, 17, 24, 31 and June 8, 1924, pp. 114-115, 123-124, 134-135, 143-144, 154-156, and 162-165, 13 figs. Describes automatic machines used for casting parts of 1 to 50 g. weight. Alloys used are mainly white metal; soft alloys of lead, tin, antimony and copper; hard alloys, of zinc, tin and aluminum. Molds used, vertical and horizontal; apparatus made by Gebr. Eckert in Nuremberg.

DIELECTRICS

[See also INSULATION, ELECTRIC.]

Liquid, Disruptive Strength of. Electric Strength of Some Liquid Dielectrics (Ueber die elektrische Festigkeit einger flüssiger Dielektrika), J. Sorge. Archiv für Elektrotechnik, vol. 13, no. 3, July 7, 1924, pp. 189-212, 15 figs. Results of experiments for puncture test with pure liquid hydrocarbons, including some transformer oils; dependence of disruptive strength on gap and curvature of electrodes on temperature, on surface and material of electrodes, on frequency, etc.

Losses. Methods of Measuring Losses in Dielectrics with High-Tension Monophase Current (Méthodes de mesure des pertes dans les diélectriques en courant monophasé à très haute tension), P. Capdeville and R. Laroche. Revue Générale de l'Electricité, vol. 16, no. 17, Oct. 25, 1924, pp. 670-678, 18 figs. Discusses methods with and without use of resistances, especially methods based on use of a reflecting electro-dynamic wattmeter.

Review of Literature on the Dielectric Losses and the Cause of Breakdowns of Solid Dielectrics, Mary Z. Demerec. Sibley Jl. of Eng., vol. 38, no. 3, Mar. 1924, pp. 86-91 and 96, 7 figs. Brief and sketchy review of subject; indicates that present tendency seems to be away from theoretical formulas and toward more practical treatment.

Properties. The Properties of Dielectrics G. L. Addenbrooke. Nature (Lond.), vol. 113, no. 2840, Apr. 5, 1924, pp. 490-491, 2 figs. Conclusions derived from long study of dielectric actions.

Residual Charge and Conductivity. On the Variation of Residual Charge and the Ratio of Electrical Conductivity to Capacity Due to Temperature, Hikoo Saegusa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 432, July 1924, pp. 651-678, 83 figs. Results of investigation of crystalline and amorphous dielectrics. (In Japanese, with abstract in English.)

Solid, Breakdown of. See Losses.

Solid, Disruptive Strength of. Some Notes on the Disruptive Strength of Solid Dielectrics, A. A. Ahmed. World Power, vol. 1, no. 5, May 1924, pp. 281-287, 7 figs. Theoretical investigation of distribution of electric stress in case of plate electrodes, and comparison of results with those obtained by experiment performed on analogous electrolytic medium.

Theory. Dielectrics in the Light of the New Conception of the Atom (Das Dielektrikum im Lichte der neuen Atomvorstellung), G. Jacoby. Elektrotechnische Zeit., vol. 45, no. 37, Sept. 11, 1924, pp. 977-981, 13 figs. Explains behavior of dielectrics in electric field from standpoint of electronic and atomic theory; polarization and dielectric constants, electric puncture, etc.

DIES

Automobile-Fender. Interesting Tools for Drawing Fenders, S. E. Walke. Forging—Stamping—Heat Treating, vol. 10, no. 9, Sept. 1924, pp. 355-356, 8 figs. Describes method used in designing dies for forming crowned automobile fenders having a reversed curve at junction of running board and front fender.

Bending. A Roller Bending Die for Channels, E. Parsons. Forging—Stamping—Heat Treating, vol. 10, no. 12, Dec. 1924, pp. 455-456, 5 figs. Pieces are produced which are not marred in any way by bending die; material is plated and polished before bending operation, greatly reducing cost.

Blanking and Extruding, Steel for. Steel for Blanking and Extruding Dies, E. W. Barker. Forging—Stamping—Heat Treating, vol. 10, no. 3, May 1924, pp. 195-197, 6 figs. Selection of steel, design and heat treatment necessary for long life and rapid production; deep hardening and resistance to abrasion requisite qualities.

Die Casting. See DIE CASTING, Machines, Alloys and Dies.

Die Sinking. See MILLING MACHINES, Attachments.

Drawing. Designing Drawing Dies, E. Heller. Machy. (N. Y.), vol. 30, nos. 8 and 9, Apr. and May 1924, pp. 579-582, 10 figs., and 687-691, 7 figs. Factors to be taken into consideration in designing dies for drawing light-weight metal; operation of drawing die, etc.; determining size of blank for a shell of given dimensions and number of operations to complete work.

Designing Drawing Dies. Machy. (Lond.), vol. 24, nos. 611 and 614, June 12 and July 3, 1924, pp. 341-344 and 422-426, 14 figs. Radii over which metal can be drawn, type of equipment used, operation of drawing die, design of first-operation die, die for final drawing operation, design of blank holders, computing blank diameter of shells of unusual shapes, determining number of operations required, combination die for blanking and drawing, troubles encountered in drawing light-gage metal, etc.

The Redevelopment of the Drawing Die, S. S. Erpward. Forging—Stamping—Heat Treating, vol. 10, no. 8, Aug. 1924, pp. 292-294, 6 figs. Highest attainment in development of drawing dies may be traced to demands of automobile manufacturer for quantity production.

Drop-Forging. Drop Forging Dies—Layout and Design, W. Anslow. Forging—Stamping—Heat Treating, vol. 10, no. 7, July 1924, pp. 250-254, 18 figs. Parting line, contraction and balance are important considerations in laying

out dies. Life of dies is, to a large extent, dependent upon their design. Reprinted from Jl. of (British) Assn. Drop Forgers & Stampers.

Drop-Forging Dies: Materials, Allowances, Hardening, and Tempering. Mech. Wld., vol. 76, no. 1977, Nov. 21, 1924, pp. 325-326. Choice of material; allowance for shrinkage; draft allowance; amount of flash; use of lead proof.

Vital Factors in Design of Drop Forging Dies, W. Anslow. Can. Machy., vol. 32, no. 10, Sept. 4, 1924, pp. 27-29, 18 figs. Points out that parting line, contraction and balance are important considerations in layout; life of dies, to large extent, is dependent upon design.

Forging. Forging Dies (Das Schmieden im Gesenk), J. Staack. Werkstattstechnik, vol. 18, no. 20, Oct. 14, 1924, pp. 575-576, 7 figs. Advantages of die forging. Production of dies of various types.

Machine Forging Dies, C. C. Hermann. Machy. (N. Y.), vol. 30, nos. 9 and 10, and vol. 31, no. 1, May, June, and Sept., 1924, pp. 674-676, 754-757, and 34-36, 12 figs. See also Machy. (Lond.), vol. 24, nos. 307, 615, and 624, May 15, July 10, and Sept. 11, 1924, pp. 205-207, 453-455, and 740-742, 13 figs. Deals with design and use. Fundamental principles of design of forging dies, their heat treatment; examples of drop-forging work, procedure in designing dies.

Steels for Forging Machine Dies, E. R. Frost. Forging—Stamping—Heat Treating, vol. 10, no. 10, Oct. 1924, pp. 368-371, 3 figs. Factors entering into choice of best die steel; points out that no definite formula or rule can be given which will cover many conditions encountered.

Taking the Guesswork Out of Dies, C. C. Rhead. Forging—Stamping—Heat Treating, vol. 10, no. 3, May 1924, pp. 188-193, 3 figs. Records covering die performance essential to efficient production; discusses system for recording performance of dies used in production of pressed-metal parts.

Heat Treatment. See STEEL, HEAT TREATMENT OF, Dies.

Piercing. See Progressive.

Progressive. Progressive Dies for Piercing, Bending, and Blanking, W. Richards. Machy. (Lond.), vol. 24, no. 606, May 8, 1924, pp. 174-175, 5 figs. Comments on progressive die for production of bracket, described in same journal (vol. 23, p. 543), and shows that simpler tool and simpler method of producing piece, in one operation, are both available.

Progressive Dies for Piercing, Bending and Blanking, I. Bernard Black. Machy. (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 371-372, 5 figs. partly on p. 373. Describes "follow" and "progressive" die employed to produce locating bracket used in electrical device.

Punches and Standard Sets. See PUNCHES, Dies and.

Screw-Cutting. Screw Cutting, H. Appleyard. Mech. Wld., vol. 76, nos. 1960, 1964, and 1970, July 25, Aug. 22, and Oct. 3, 1924, pp. 50-51, 114-115, and 210-211, 20 figs. Discusses screw cutting by means of dies, including solid dies, round or button dies, spring dies and self-opening dies and best type for given purpose; form and angle of cutter, etc.

Self-Opening, Manufacture of. Development and Manufacture of the Self-Opening Die. Am. Mach., vol. 61, nos. 15 and 16, Oct. 9 and 16, 1924, pp. 563-566 and 621-624, 20 figs. Describes accurate tool work. Grinding operation on smaller parts; special jigs and fixtures; testing parts for accuracy; care of die.

Sewing-Machine Parts. Dies for Producing a Complicated Sewing-machine Part, C. E. Stevens. Machy. (N. Y.), vol. 30, no. 10, June 1924, pp. 783-786, 6 figs. Piercing and blanking die; die for second and for final forming operation.

Shell, Blank Diameters. Method for Determining Blank Diameters, R. L. Wakelee. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 704-705, 3 figs. Method for determining blank diameters of drawn shells which is simple to apply and gives results that agree more closely with proven blank size than any commonly used methods tried out by author.

DIESEL ENGINES

Air Compressors of. See AIR COMPRESSORS, Diesel-Engine.

Air Supply. A Note on the Air Supply for Large Motor Ships, P. T. Brown. Inst. Mar. Engrs.—Trans., vol. 36, July 1924, pp. 101-140, 11 figs. Discusses air requirements of Diesel machinery for injecting and pulverizing fuel, and for maneuvering engines and other purposes; Lloyd's rules; air compressors and their size.

Asphalt Plants. Diesels in an Asphalt and Petroleum Plant. Oil Engine Power, vol. 2, no. 9, Sept. 1924, pp. 474-475, 2 figs. Power for operation of Warner plant of Warner-Quinlan Asphalt Co. is furnished by two 200-b.hp. McIntosh & Seymour Diesel engines of vertical four-cycle trunk-piston type; two years without repairs and three-month uninterrupted operating periods have characterized installation.

Beardmore-Tosi. Building Marine Diesel Engines. Machy. (Lond.), vols. 23 and 24, nos. 600 and 601, Mar. 27 and Apr. 3, 1924, pp. 825-828 and 17-21, 25 figs. Machining operations on Beardmore-Tosi engine.

Bethlehem. Largest Two-Stroke-Cycle Diesel Built in America. Power, vol. 59, no. 11, Mar. 11, 1924, pp. 406-408, 6 figs. Bethlehem 2900-hp. two-stroke-cycle engine has no cylinder head; scavenging pumps are at side of frame, scavenging valves in top of cylinder.

The Bethlehem Two Cycle Diesel Engine. Mar. News, vol. 10, no. 10, Mar. 1924, pp. 75-78 and 95, 11 figs. Particulars of new Bethlehem oil engine which is of vertical, two-stroke cycle, single-acting type, constructed in units of 4, 6 or 8 cylinders and running at a speed of from 116 r.p.m. for land power and twin-screw marine installations down to 90 r.p.m. for single-screw marine use. Notes on 6-cylinder two-cycle oil engine developing 2500 s.h.p. at 90 r.p.m., installed on motorship Cubore.

Types of Modern Power-Plant Oil Engines. Oil Engine Power, vol. 2, no. 3, Mar. 1924, pp. 152-156 and 161, 8 figs. Critique of design features of Bethlehem 2900-b.hp. 2-cycle unit, and complete details relating to design and method of operation of its axial scavenging valve.

Burgerhout-Nobel. The First Burgerhout-Nobel Diesel Engine. Mar. Engr. & Motorship Bldr., vol. 47, no. 567, Dec. 1924, pp. 449-453, 9 figs. Supplementary description of Nobel Diesel engine as manufactured by Burgerhout's Eng. & Shipbldg. Co., Ltd., Rotterdam.

Camellaird-Fullagar. British Yard Builds Largest Marine Diesel Engine. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 238-240 and 242, 3 figs. Particulars of 6-cylinder Camellaird-Fullagar opposed-piston engine developing 3000 b.hp. at 90 r.p.m., built by Palmers Shipbldg. & Iron Co.

Castings for. Castings for Diesel Engines. Foundry Trade Jl., vol. 30, no. 433, Dec. 4, 1924, pp. 475-480, 6 figs. Abstracts of papers read before joint conference of Instn. Brit. Foundrymen and Instn. Mech. Engrs., as follows: Temperature Stresses and Working Conditions in Diesel Engine Cylinders, A. L. Mellanby; Some Characteristics of Cast Iron for Oil Engine Castings, A. Campton; Oil Engine Design as Affected by Foundry Practice, Jas. Richardson; Oil En-

gine Design from a Foundryman's Point of View; and discussion of papers.

Central-Station. Diesel Engine for Stand-By Service, H. L. Conklin. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 851-852, 2 figs. Diesel engine shows lower fuel cost than steam equipment for peak-load service in water-power plant.

Diesel Engines Turn Tables on Central Station. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 366-370, 6 figs. Atlantic Wire Co., Branford, Conn., changed power source from steam plant to Diesel-engine drive; costs chargeable are considerably less per kw-hr. than purchased current cost; two six-cylinder Lombard Diesel engines rated to develop 180 b.hp. each and direct-connected to two Westinghouse 3-phase 200 kva. alternators and 10-kw. direct-connected exciters.

Municipality Replaces Water-Power with Oil Engines. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 379-380 and 385, 3 figs. When City of Marshall, Mich., began to grow so fast that all available water flow was used up in attempt to keep pace with increasing power demands, electric current was purchased outside at moderate rates. Subsequent steep rises in cost of purchased power made city turn to oil-engine power, and Diesels since installed have netted big operating gains.

Central-Station Service. See CENTRAL STATIONS, Diesel-Engined.

Combustion Phenomena in. Combustion Phenomena in Diesel Engines (Verbrennungsvorgänge im Dieselmotor), H. v. Wartenberg. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 7, Feb. 16, 1924, pp. 153-154. Explains cause for poorer ignition and tendency to soot formation with burning of tar oils in Diesel engines, and points out that combustion can be accelerated by much finer breaking up of drops, probably through admixture of large quantities of water emulged in oil, and through employment of higher temperatures in compression space.

Compressorless. Compressorless Diesel Engines. Eng. Progress, vol. 5, no. 12, Dec. 1924, pp. 249-253, 11 figs. Antechamber Diesel engines; engines with jet atomization.

Injection and Combustion Phenomena in Compressorless Diesel Engines (Einspritz-und Verbrennungsvorgänge in kompressorlosen Dieselmotoren), V. Heidelberg. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 40, Oct. 4, 1924, pp. 1047-1052, 24 figs. Operating characteristics of compressorless engines with direct injection; influence of various factors; heat-theoretical comparison with compressor Diesel engines.

Control Apparatus. Control Apparatus (Note sur les appareils à gouverner). Bul. Technique du Bureau Veritas, vol. 6, nos. 7 and 8, July and Aug. 1924, pp. 123-127 and 143-146, 13 figs. Reviews steam, hydraulic, and electric apapratus and auxiliaries.

Costs. Bids Show Range in Diesel Costs. Mar. Rev., vol. 54, no. 9, Sept. 1924, pp. 347-348, 2 figs. Analysis of bids and of reasons for difference; compares different types of Diesel engines, two- and four-cycle, single- and double-acting, air- and solid-injection.

Crankshafts, Torsional Vibrations in. Influence of Torsional Vibrations on Diesel Engine Crankshafts. Motorship, vol. 9, no. 12, Dec. 1924, pp. 898-900 and 905, 4 figs. How mysterious fractures occurred, reason discovered and cause eliminated.

Design. Calculation of Principal Dimensions of Stationary Diesel Engines (Berechnung der Hauptabmessungen von ortsfesten Dieselmaschinen), A. Balogh. Praktische Maschinen-Konstrukteur, vol. 57, no. 9, Mar. 15, 1924, pp. 101-104, 4 figs. Calculations for 60-hp. stationary Diesel; working of Diesel engines; table of principal dimensions.

Developments. The Diesel Engine, A. Nägel. Engineering, vol. 118, no. 3055, July 18, 1924, pp. 110-112, 4 figs. Discusses recent improvements in Diesel engine construction, including (1) freeing main type engine of handicaps due to too close adherence to original model, (2) use of two-stroke cycle for large engines, (3) injection and atomizing of fuel without aid of compressed air, (4) use of fuel of low ignitability. Abstract of paper read before World Power Conference.

Double-Acting. A New Type of Double-Acting Diesel Engine for Marine Purposes, G. J. Lugt and H. Hunter. Engineering, vol. 118, no. 3053, July 4, 1924, pp. 26-30, 8 figs. Also Engineer, vol. 138, no. 3575, July 4, 1924, pp. 23-24, 6 figs.; and Shipbldg. & Shipping Rec., vol. 24, no. 1, July 3, 1924, pp. 7-11, 5 figs. Details of design and construction of new type of four-cycle double-acting engines, developing about 80 per cent more power than single-acting engines of same size, using Arschaouloff's system of solid injection. Piston diam., 31½ in.; stroke, 55 in.; hp. in single cyl. at 95 r.p.m., 600.

American-Developed Double-Acting Diesel Engine. Motorship, vol. 9, no. 9, Sept. 1924, pp. 668 and 673-674, 4 figs. Particulars of new two-cycle, air-injection engine capable of being flanged directly to existing propeller shafts in Shipping Board vessels with minimum hull alterations.

Double-Acting Diesel of Unique Design. Motorship, vol. 9, no. 4, Apr. 1924, pp. 261-263, 5 figs. How North British 200 s.h.p. unit differs from all other 2-cycle double-acting marine oil engines.

Double Acting Diesels, Johnstone-Taylor. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 605-606, 3 figs. Describes designs by two British firms, namely, North Eastern marine and North British design.

Double-Acting Marine Diesel Engines. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 707-708, 7 figs. on supp. plates. See also Engineer, vol. 137, nos. 3570 and 3571, May 30 and June 6, 1924, pp. 604 and 626-627, 5 figs. partly on p. 630. Details of 1000-i.hp. experimental 4-cycle North-Eastern Werkspoor engine.

More on the Double-Acting Diesel Engine. Motorship, vol. 9, no. 9, Sept. 1924, pp. 659-660, 4 figs. Uniflow port scavenging system developed by Maschinenfabrik Augsburg-Nürnberg has given successful test results.

Tests of New Double-Acting Development Cylinder. Motorship, vol. 9, no. 8, Aug. 1924, pp. 578-579, 5 figs. As result of shop tests of first single-cylinder double-acting type of four-cycle Diesel engine built at Wallsend-on-Tyne, Eng., by North Eastern Marine Eng. Co., in collaboration with Werkspoor of Amsterdam, Alfred Holt & Co., Liverpool, has ordered a 4000 s.hp. engine for single-screw motorship.

The Development of High-Power Diesels, Johnstone-Taylor. Gas & Oil Power, vol. 20, no. 230, Nov. 6, 1924, pp. 23-25, 2 figs. Possibilities of double-acting type for land work.

See also Worthington.

Exhaust-Chamber Casting. Making a Diesel Engine Water-Cooled Exhaust Chamber, A. J. Richman. Metal Industry (Lond.), vol. 25, no. 20, Nov. 14, 1924, pp. 477-479, 6 figs. Casting measures 6 ft. long by 2 ft. 10 in. outside diam., and is cored for water jacket giving ½-in. thickness of metal on one side and ⅝-in. on other; details of molding and casting.

Exhaust Temperature. The Significance of Exhaust Temperature, P. H. Smith. Engineering, vol. 118, no. 3068, Oct. 17, 1924, pp. 544-547. Gives results of experiments carried out on Carels-type Diesel engine.

Experimental Work. Further Experimental Work on Diesel Engines, R. Beeman. Shipbldg. & Shipg. Rec., vol. 23, no. 16, Apr. 17, 1924, pp. 459-461. See also Mar. Engr. & Motorships Bldr., vol. 47, no. 561, June 1924, pp. 227-231, 2 figs. Experimental work, dealing with Diesels for warships, dimensions and weight, aluminum alloy pistons, development of high mean pressure, determination of suitable profile for fuel cam-actuating sprayer, shoping of combustion chamber, rate of heat flow and its attendant stresses, lubricating oil consumption, and alternative fuels. Abstract of paper read before Instn. Nav. Architects.

Fairfield-Sulzer. Fairfield-Sulzer Engines for the Union Steam Ship Company of New Zealand, Ltd. Shipbldg. & Shipg. Rec., vol. 23, no. 12, Mar. 20, 1924, p. 333. Particulars of engines to be installed in a new motor passenger liner, the Aorangi; four sets of Fairfield-Sulzer Diesel engines each having six cylinders 27½ in. diameter by 39-in. stroke, working on 2-stroke cycle; 16,000 i.hp. on four shafts.

Four-Cycle, Supercharging of. Will Supercharging Revolutionize Four-Cycle Diesel Operation? Oil Engine Power, vol. 2, no. 3, Mar. 1924, pp. 148-152, 8 figs. Supercharging development work in Germany and America in connection with four-cycle Diesel engines.

French Installations. Reconstructing France by Aid of Diesel Power. Oil Engine Power, vol. 2, no. 1, Jan. 1924, pp. 6-11, 9 figs. Notes on several of large Diesel plants installed during and since war; one engine is larger than any yet built in U. S. A.

Fuel Injection. Investigation of the Fuel-Injection Process in Diesel Engines (Untersuchungen über den Einspritzvorgang bei Dieselmaschinen), W. Riehm. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 25, June 21, 1924, pp. 641-645, 10 figs. Discusses fundamentals of injection process; describes experimental plant, tests with water and oil, absorption of heat up to ignition.

Fuel-Measuring Pump. Some Effects of Fuel Measuring Pump Design on Diesel Engine Performance, J. E. Canoose. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 4, Nov. 1924, pp. 573-623, 15 figs. Results of study on R-21 to 27 class submarine engines in service; it is shown that natural result of failure of fuel-measuring pump to function properly, unless it be adjustment unbalance, is lowered volumetric efficiency.

Fuel Valves. Diesel Engine Fuel Valves, H. F. Birnie and R. C. Baumann. Power Plant Eng., vol. 28, nos. 6, 7, 8 and 11, Mar. 15, Apr. 1, May 1 and June 1, 1924, pp. 336-338, 381-383, 488-491 and 598-599, 24 figs. Mar. 15: Atomization an important function of fuel valve; plate atomizer valves. Apr. 1: Improved combustion resulting from study of valve details. May 1: Construction and action of commercial types of fuel valves. June 1: Valves used on horizontal engines; special valves for heavy oils.

Generator Drive. Oil-Engine Driven Shop Generators in the German Navy, W. Laudahn. Schiffbau, vol. 25, nos. 6 and 8, Jan. 9 and 23, 1924, pp. 157-161 and 179-187, 2 figs. The engines of the German Gen. Elec. Co. (AEG) with 12-kw. power. Results of workshop tests. For reference to previous articles in this series see Eng. Index 1922 and 1923.

Great Britain. Diesel Engine Progress in Great Britain. Pac. Mar. Rev., vol. 21, no. 8, Aug. 1924, pp. 411-414, and 417, 11 figs. Discusses increased application of Diesel engines for all types of ships, types of Diesel, pros and cons.

Heat Losses. Investigations of Diesel Engines (Untersuchungen an der Dieselmaschine), K. Neumann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 4, Jan. 26, 1924, pp. 77-80, 5 figs. Thermodynamic circle process and working losses; heat diagrams of engine for complete and incomplete expansion; calculation of heat-transmission coefficient for combustion and expansion independent of piston diagram.

Heavy-Oil-Burning. Burning Boiler Oil in Diesel Engines, C. L. Ruegg. Power, vol. 60, no. 13, Sept. 23, 1924, pp. 488-489, 3 figs. Discusses use in Diesel engines of heavy oil now being burned under boilers. Since price is below that of refined oils, owners of Diesel engines should make necessary rearrangement of fuel system to permit them to take advantage of the situation. Deals with changes necessary.

Burning Heavy Fuel Oil in Diesel Engines, R. Hildebrand. Power House, vol. 17, no. 14, July 20, 1924, pp. 26 and 39, 1 fig. Satisfactory results were obtained with small three-cylinder, single-acting, four-stroke vertical engine developing 200 h.hp. at 257 r.p.m.

High-Power. High-Power Diesel Engines (Hochleistungs-Dieselmaschinen), F. E. Bielefeld. Wirtschaftsmotor, vol. 6, no. 7-8, Aug. 25, 1924, pp. 7-8, 4 figs. Discusses compressor and compressorless types; improvements in atomizing and injecting fuel oil; comparisons with Scott-Still engine.

Inland-Waterway Vessels. Diesel Engines for Inland-Waterway Navigation (Dieselmaschinen auf Binnenwasserstrassen), P. Kühnle. Schiffbau, vol. 25, no. 11, Mar. 12, 1924, pp. 276-277, 2 figs. Discusses factors influencing employment of Diesel in place of steam engines.

The Diesel Engine for Inland Navigation (Der Dieselmotor in der Binnenschiffahrt), P. v. Schuh. Schiffbau, vol. 25, nos. 24, 26, and 27, Sept. 24, Oct. 22, and Nov. 5, 1924, pp. 651-654, 729-735, and 754-760, 7 figs. Use of Diesel engines for navigation of Volga, Rhine, and other rivers, and lakes; comparative costs, showing advantage of Diesel engines; comparative data for steam and Diesel operation of cargo vessels between Ruhrort and Mannheim; comparative equipment for steam and Diesel operation of cargo boats.

Knudsen. Knudsen Diesel. Pac. Mar. Rev., vol. 21, no. 2, Feb. 1924, p. 115, 3 figs. Two-cycle engine of opposed-piston type, but with cylinders set on acute angle with common combustion chamber at their upper end.

Locomotives with. See LOCOMOTIVES, Diesel-Compressed Air; Diesel-Electric; Diesel-Engined.

Low-Powered. Low-Powered Diesel Engines (La question du Diesel de faible puissance), P. Simondet. Arts & Métiers, vol. 77, no. 42, Mar. 1924, pp. 81-105, 22 figs. Deals with technical, financial, and manufacturing problems of low-power engines working on Diesel cycle, with special reference to difficulties which may account for comparatively restricted extent to which they have hitherto been employed; among types of engines described are Hindl and Hvid engines.

Lubrication. Lubricating Diesel Engines and Auxiliary Machinery. Mar. Eng., vol. 29, no. 5, May 1924, pp. 298-300. General rules for selecting lubricants and methods of applying them to promote economy.

The Lubrication of Diesel Engines (Ueber Dieselmaschinen-Schmierfragen), W. Ernst. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 18, May 3, 1924, pp. 451-454, 14 figs. Points out that in view of the different parts to be lubricated use of different oils for various applications is desirable, but it is sometimes necessary to use a unit lubricating oil which has to be adapted to the various applications including that of cooling pistons; gives examples of difficulties encountered in lubrication of Diesel engines with a unit oil.

See also LUBRICATION, Prime Movers.

M.A.N. How the World's Largest Diesel Was Built, Fred. Englert. Motorship, vol. 8, no. 12, Dec. 1923, pp. 848-849 and vol. 9, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 40-41, 119, and 185-187, 12 figs. Relates most serious problems which faced engineers of M.A.N.'s plant, Nürnberg, in bringing to practical state highest powered Diesel engine ever constructed, developing over 17,000 s.hp.

The High-Power Diesel Engine of Nürnberg, W. Laudahn. Power, vol. 59, nos. 16 and 17, Apr. 15 and 22, 1924, pp. 603-606 and 642-644, 8 figs. Discussion of difficulties met with in designing 12,000-hp. Diesel engine; account of explosion that wrecked engine. Translated from Zeit. des Vereines Deutscher Ingenieure, Dec. 8, 1923.

Two-Cycle Double-Acting M. A. N. Diesel Engine (Moteur Diesel à deux temps et à double action de la M. A. N.). Bul. Technique du Bureau Veritas, vol. 6, no. 10, Oct. 1924, pp. 185-187. Engine is said to develop 1.9 times as much power as single-acting engine of same dimensions; deals principally with first engine built from parts of 12,000-hp. engine, previously built by way of experiment in Nuremburg works; nine-cylinder engine to deliver 11,000 hp. is being developed in works. Translated from Werft Reederei Hafen.

See also Double-Acting, Smit-M.A.N.

Maintenance and Care. The Maintenance and Care of Diesel Engines, O. Olson. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 169-170. Practical notes on operation of Diesel engines, compressors, and motorship auxiliaries.

Manufacture. Building Diesel Oil Engines for Ford, L. S. Love. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 977-982, 12 figs. Methods employed in Blake & Knowles plant of Worthington Pump & Machy. Corpn.; crankshaft bearings planed instead of bored; special fixture made for jointing bedplates; crankshafts turned direct from forged block without preliminary removal of stock.

One of America's Prominent Diesel Plants. Motorship, vol. 9, no. 6, June 1924, pp. 434-436 and 441, 6 figs. Describes Cleveland, Ohio, plant of Winton Engine Works. Quantity production, handling and routing highly developed.

Marine. Latest Developments in Diesel-Engine Ship Propulsion (Neuste Bestrebungen beim Schiffsantrieb durch Dieselmotoren), E. Goos. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 18, May 3, 1924, pp. 435-441, 18 figs. Discusses present tendencies in development of marine Diesel engines; examples and practical results; measures for increasing efficiency and improving operating safety and economy; drive of auxiliary machinery; heating and motor oils.

New Model of Well-known Marine Diesel Engine. Motorship, vol. 9, no. 5, May 1924, pp. 341-345, 8 figs. 2-cycle design of Swan, Hunter & Wigham Richardson is rated at 2000 b.hp. and weighs 242 tons; combustion space heat stresses minimized.

Plan New Diesel for Big Output. Mar. Rev., vol. 54, no. 3, Mar. 1924, pp. 114-116, 5 figs. Description of 6-cylinder 4-cycle crosshead type Diesel engine developing 2000 i.hp. at a maximum of 100 r.p.m. with a 30-in. bore and 48-in. stroke, installed on Suphenco.

Recent Marine Diesel Engines (Neuere Schiffs-Dieselmaschinen), O. P. Kühnle. Schiffbau, vol. 25, no. 19, July 9, 1924, pp. 517-520, 5 figs. Discusses advantages of hot-bulb two-stroke and four-stroke engines, and describes engine built by Motorenwerke, Mannheim, of 1600 hp. and 120 r.p.m., using only 174 g. fuel per hp-hr.

The Maintenance of Marine Internal-Combustion Engines. Mar. Engr. & Nav. Architect, vol. 47, no. 557, Feb. 1924, pp. 53-54. Working and operation of marine Diesel engines considered practically.

See also Beardmore-Tosi; Bethlehem; Camel-laird-Fullagar; Double-Acting; McIntosh & Seymour.

Maybach Automotive and Rail-Car. Maybach High-Speed Automotive and Rail-Car Diesel. Oil Engine Power, vol. 2, no. 11, Nov. 1924, pp. 595-596, 2 figs. Heavy-oil air-injection engine weighing only 19 lb. per b.hp. develops 150 b.hp. at 1300 r.p.m.; points way to solution of problem of using unmodified Diesel principle in engines of strictly automotive character.

McIntosh & Seymour. An American 2,600 i.h.p. Four-Cycle Marine Engine. Motorship, vol. 9, no. 10, Oct. 1924, pp. 751-755, 9 figs. Motorship, vol. 9, no. 10, Oct. 1924, pp. 751-755, 9 figs. Describes vertical, single-acting, 4-cycle, crosshead type, directly-reversible engine recently completed by McIntosh & Seymour Corpn. Does not differ radically from their previous design, but incorporates modern improvements.

Mexican Fuel Oil. Burning Heavy Fuel Oil in Diesel Engines, R. Hildebrand. Eng. Wld., vol. 25, no. 3, Sept. 1924, pp. 167-168, 1 fig. Describes method employed by Fulton Iron Works Co. in solving problem of using heavy fuel oil in Diesel engines.

Michel. The Michel Engine (Der Michel-Motor). Motor u. Auto, vol. 21, no. 5, May 10, 1924, pp. 40-41, 4 figs. Two-stroke-cycle Diesel engine with new arrangement for transmission of piston force; small engines requiring little space; good balancing of masses.

Motorcycle. A New Heavy-Oil Engine for Motorcycles (Ein neuer Fahrzeug-Schwerölmotor), E. Frey and C. Fischer. Motorwagen, vol. 27, no. 2-3, Jan. 20-31, 1924, pp. 28-29, 2 figs. Describes compressorless Diesel engine which can be operated with all kinds of oil fuel, including crude, paraffin, lignite-tar and shale oil, as well as with light fuel oils, such as gasoline, benzol, alcohol and petroleum, without making any changes in engine.

Non-Reversible. Reversible and Non-Reversible Marine Diesel Engines (Umsteuerbare und nicht umsteuerbare Schiffsdieselmaschinen), M. W. Gerhards. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 579-580. Critical discussion of advantages of non-reversible engines with reversible intermediate gears over directly reversible engines.

Nordberg. Types of Modern Power-Plant Oil Engines. Oil Engine Power, vol. 11, no. 4, Apr. 1924, pp. 203-209, 12 figs. Describes Nordberg model having a cylinder output of 550 b.hp. at 120 r.p.m.; many 4-cylinder units of 2200 hp. are in service. Data on operating and installation costs.

Operation. Modern Diesel Engine Installation, F. Veitenheimer. Military Engr., vol. 16, no. 88, July-Aug. 1924, pp. 311-315, 5 figs. Discusses operation and operating cost of Diesel engine. Describes a stationary Diesel engine plant installed by U. S. Engr. Dept. in Hawaiian Islands; main equipment consists of three 135-hp. 4-cycle single-acting vertical type 6-cylinder Diesel engines, each directly connected to a 90-kw. 125-volt. d.c. generator.

Practical Diesel Engineering, L. R. Ford. Mar. Eng., vol. 29, nos. 7, 8, 9, 10, 11, and 12, July, Aug., Sept., Oct., Nov., and Dec., 1924, pp. 389-393, 473-476, 543-546, 607-610, 669-673, and 741-744, 26 figs. Practical information regarding construction, operation, and upkeep of Diesel engines. July: Action of gases in cylinder; definitions; pressure-volume curves; cycles and cyclic

processes; Otto and Diesel cycles. Aug.: Use of heat cycles; how horsepower of a reciprocating engine is measured; indicator. Sept.: Mechanical cycles; construction of two- and four-cycle engines; opposed-piston and double-acting engines. Oct.: Normal practice; engine-room arrangements; preparations for starting engines. Nov.: Maneuvering ship; routine under way; engine-room stores; purchasing fuel and lubricating oils; precautions in handling fuel oil. Dec.: Derangements likely to occur in operation and adjustments required for their correction.

Opposed-Piston. Palmers' 3,000 s.h.p. Opposed-Piston Diesel Engine. Motorship, vol. 9, no. 2, Feb. 1924, pp. 118-119, 1 fig. Single-screw unit for 10,000-ton single-screw tanker, constructed on Fullagar principle with air injection.

Pipe-Line, Lubrication of. Pipe Line Diesels and Their Lubrication, F. Thilenius. Oil Engine Power, vol. 2, no. 2, Feb. 1924, pp. 67-76, 13 figs. Developments carried out on Prairie Pipe Lines. Describes new system which utilizes all available exhaust heat in conjunction with reclaimers, purifiers, and special filters, combined into standard units and eliminates all lubricating troubles.

Power Plants, Use in. Diesel Engines as Economical Power Producers, J. Ander. Power House, vol. 17, no. 6, Mar. 20, 1924, pp. 30-31, 1 fig. Data on Diesel engine plants and operating cost of same under Canadian conditions. Serious competitor of hydroelectric power.

Use of Diesel Engines in Power Plants, L. R. Ford. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1003-1004. See also South. Engr., vol. 42, no. 4, Dec. 1924, pp. 55-58. Considerations affecting adaptability of Diesel engine.

Preheating Fuel Oil. Preheating Fuel Oil for Diesel Engines, Rob. A. Melrose. Power, vol. 60, no. 23, Dec. 2, 1924, p. 904. Discusses methods.

Problems of Development. Some Problems in Oil Engine Development, O. P. Robinson. Tech. Eng. News, vol. 5, no. 5, Dec. 1924, pp. 178-179 and 188, 2 figs. Discusses difficulties encountered in development of Diesel engines.

Pumping Plants. See PUMPING STATIONS, Diesel-Engine-Driven.

Repairing. Overhauling a Diesel Engine, M. S. Howard. Power Plant Eng., vol. 28, no. 2, Jan. 15, 1924, pp. 139-141, 7 figs. Where to look for wear and how to handle repair work.

Scavenging Blowers for. Centrifugal Scavenging Blowers for Two-Cycle Marine Diesel Engines, E. Klingelfuss. Brown Boveri Rev., vol. 11, no. 4, Apr. 1924, pp. 67-80, 28 figs. Details of design and construction of centrifugal scavenging blowers, their advantages, and prime-movers for them; arrangement on board ship; operation in conjunction with Diesel engines.

Semi. See SEMI-DIESEL ENGINES.

Smit-M.A.N. A New Dutch Diesel Engine. Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 265-266, 5 figs. J. & K. Smit of Kinderdijk, Holland, have commenced manufacture of M. A. N. Diesel engines. Particulars of unit recently completed, 3-cylinder 60-b.hp. M. A. N. 4-stroke Diesel engine.

Street-Car Power. Two 3,600 b.h.p. and Two 1,500 b.h.p. Diesels for Street-Car Power. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 371-373, 2 figs. Consistent and economical service of two 1,500-b.hp. Diesel engines over lengthy period, caused Shanghai Street-Car Co. to order two additional engines of 3,600 b.hp. each to meet their greater power needs.

Sulzer. A Large Diesel Engine for China. Engineer, vol. 137, no. 3572, June 13, 1924, p. 656, 1 fig. Notes on trials of 3600-b.hp. two-cycle stationary Diesel engine built by Sulzer Bros., Switzerland.

A New Sulzer Engine with Independent Scavenging. Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 267-268 and 270, 2 figs. Particulars of first Diesel engine constructed by Wallsend Slipway & Eng. Co.; Sulzer 4-cylinder unit of 2000 b.hp.

See also Fairfield-Sulzer.

Sun-Doxford. Sun-Doxford Engines of the Henry Ford II. Mar. Eng., vol. 29, no. 6, June 1924, pp. 334-337, 5 figs. First application of large Diesel engines on a Great Lakes bulk freighter. Details of engines; opposed-piston type, having four cylinders 23½ in. in diameter, each piston having stroke of 45½ in.; approximate s.hp. 3000 at 85 r.p.m.

Supercharging. See Four-Cycle.

Swan. See Marine.

Tosi. The Tosi Diesel Engine, G. C. Ziliotto. Mar. Eng., vol. 29, no. 6, June 1924, pp. 357-360, 6 figs. Discusses features of Tosi engines, principally, combined inlet and exhaust valves, injection valve, and method of cooling cylinder.

Troubles. Some Experiences of a Diesel-Engine Trouble Man, D. L. Fagnan. So. Engr., vol. 41, no. 6, Aug. 1924, pp. 44-48, 6 figs. Diesel-engine troubles and what was done to remedy them after operating engineer had failed to make good.

Two-Stroke-Cycle. Present-Day Diesel Engines —Application of the Two-Stroke-Cycle Principle, Nagel. Power, vol. 59, no. 14, Apr. 1, 1924, pp. 526-527, 3 figs. Extract of paper read before Verein Deutscher Ingenieure, June 20, 1923, at Berlin.

Two-Stroke Diesel Engine, Johnstone-Taylor. South. Engr., vol. 41, no. 8, Oct. 1924, pp. 42-44, 3 figs. Notes regarding progress of opposed-piston engine in British stationary work.

See also Bethlehem.

Types. High Power Diesels. Power Engr., vol. 19, no. 221, Aug. 1924, pp. 289-291, 7 figs. Discusses types of Diesel engines suited to electrical generation.

Use as Prime Mover. The Diesel Engine as a Prime Mover, L. H. Morrison. South. Engr., vol. 42, no. 3, Nov. 1924, pp. 50-54, 11 figs. Compares important points in favor of Diesel engine with other prime movers.

Valve Setting. Setting the Valves of a Diesel Engine, H. F. Birnie and R. C. Baumann. Power Plant Eng., vol. 28, no. 3 and 4, Feb. 1, and 15, 1924, pp. 180-182, 7 figs., and 230-232, 6 figs. Describes general process of valve setting, including fuel cams.

Valves. Valves of Diesel Engines, F. Johnstone-Taylor. Gas & Oil Power, vol. 19, no. 222, Mar. 6, 1924, pp. 97-98, 3 figs. Practical advice on their care and maintenance.

Warship. Further Experimental Work on Diesel Engines, R. Beeman. Engineering, vol. 117, nos. 3043, 3044, and 3045, Apr. 24, May 2, and 9, 1924, pp. 559, 589-591, and 624-625, 22 figs. See also Engineer, vol. 137, nos. 3566, 3567, 3568, and 3569, May 2, 9, 16, and 23, 1924, pp. 487-488, 517-518, 547-548, and 578-579, 22 figs. Discusses possibilities of application of Diesel engines for propelling machinery of surface war vessels. (Abstract.) Paper read before Instn. Nav. Architects.

Water Works. Oil Engines that Have Seen Long Water Works Service, J. H. Bender. Fire & Water Eng., vol. 75, no. 11, Mar. 12, 1924, pp. 495-496 and 513, 3 figs. Record of three units installed in Clayton, N. M., in 1911, 1912, and 1917 respectively, which have given good satisfac-

tion, demonstrating reliability of this type of motive power.

Werkspoor. North-Eastern Werkspoor Diesel Engine. Steamship, vol. 36, no. 421, July 1924, pp. 18-21, 4 figs. Describes direct-coupled, double-acting, heavy-oil engine for marine purposes built by North-Eastern Marine Eng. Co.'s works at Wallsend-on-Tyne; four-cycle single cylinder unit of 1000 i.hp.

See also Double-Acting.

Worthington. An American Double Acting Diesel. Mar. Eng. & Shipg. Age, vol. 29, no. 9, Sept. 1924, pp. 528-530, 2 figs. See also Pac. Mar. Rev., vol. 21, no. 9, Sept. 1924, pp. 454-455, 2 figs., and Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 585-587. Details of design and construction of four-cylinder, double-acting, two-cycle Worthington Diesel engine designed to develop 2400 s.hp.

Diesel Engine with Power at Every Stroke. Iron Age, vol. 114, no. 10, Sept. 4, 1924, pp. 559-560, 2 figs. Particulars of Worthington development of two-cycle double-acting prime mover which promises notable widening of oil-engine field in applicability and economy.

The Worthington 2-Cycle Double-Acting Diesel Engine. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 482-486, 10 figs. Describes types constructed by Worthington Pump & Machy. Corpn. of Buffalo, N. Y.

Worthington Builds Double-Acting Two-Stroke-Cycle Diesel Engine. Power, vol. 60, no. 12, Sept. 16, 1924, pp. 457-459, 9 figs. Engine combines a fuel economy comparable with that of best existing types of Diesel engine, with dimensions, weight, and construction cost per horsepower approaching those of reciprocating steam machinery. First unit, a single-cylinder engine, is rated at 600 to 800 hp. at speeds of 90 to 120 r.p.m., cylinders being 27 in. in diameter by 40 in. stroke.

See also Double-Acting.

DILATOMETERS

[See also TOOL STEEL, Time and Temperature, Effect on.]

Double-Mirror. Double Mirror Dilatometer for Low-Temperature Work (Ausdehnungsmessungen bei tiefen Temperaturen mit Doppelspiegeldilatometer), G. Borelius and C. H. Johansson. Annalen der Physik, vol. 75, no. 1, Aug. 1924, pp. 23-36, 5 figs. Brass plate resting on two supports has pair of parallel mirrors fixed one at either end; specimen under test is fastened rigidly at its upper end whereas its lower end is attached to center of plate; as specimen expands or contracts, this plate is bent and amount of bending is determined in usual way, using beam of light reflected from mirrors in turn; results are given for specially pure copper rods and also for crystals and zinc and cadmium.

DIRECTION FINDING

Errors of Bearings. The Effect of the Shape of the Transmitting Aerial upon Observed Bearings on a Radio Direction-Finder, R. L. Smith-Rose. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 957-963, 3 figs. Experiments to determine to what extent emission of abnormally polarized waves by aerials of different shapes from ground transmitting station was responsible for frequent occurrence of variable "night" errors at ground direction-finding station.

Navigation. A Directive Type of Radio Beacon and Its Application to Navigation, F. H. Engel and F. W. Dunmore. U. S. Bur. Standards—Scientific Papers, no. 480, Jan. 5, 1924, pp. 281-295, 10 figs. Deals with a method of guiding a ship or airplane by means of radio signals sent from a particular type of directive radio beacon; describes principle of operation of this beacon; results of tests both on shipboard and on an airplane.

Development of the Bellini-Tosi System of Direction-Finding in the British Mercantile Marine, J. A. See. Instn. Elec Engrs.—Jl., vol. 62, no. 330, June 1924, pp. 543- 550 and (discussion) 550-557, 4 figs. Account of various sources of error encountered during development of system as aid to navigation in British mercantile marine; these errors can be isolated and their causes removed one by one; deals with application of instrument to purposes of navigation; table showing high degree of accuracy which has been attained.

Modern Aids to Navigation, J. O. G. Cann. Can. Ry. Club—Official Proc., vol. 23, no. 6, Sept. 1924, pp. 22-31 and (discussion) 31-36. Discusses location of ship's position by radio.

Radio Acoustic Method of Position Finding in Hydrographic Surveys, N. H. Heck, E. A. Eckhardt and M. Keiser. U. S. Coast & Geodetic Survey—Spec. Pub. no. 107, Serial no. 277, 1924, 23 pp., 16 figs. Discusses hydrographic problem and installation details. Describes apparatus and method of operation.

Some Radio Direction-Finding Observations on Ship and Shore Transmitting Stations, R. L. Smith-Rose. Instn. Elec. Engrs.—Jl., vol. 62, no. 332, Aug. 1924, pp. 701-711, 2 figs. Account of experiments conducted with two direction-finding receiving stations taking observations on ship transmitters located at various positions in North Sea between England and Europe.

The Problem of Beacon Stations, J. A. Slee. Wireless Wld., vol. 15, no. 11, Dec. 10, 1924, pp. 330-334, 4 figs. Deals with stations for marine navigation. Describes purposes of system, and discusses its advantages and limitations.

Wireless Navigation, J. Robinson. Roy. Soc. Arts—Jl., vol. 72, no. 3735, June 20, 1924, pp. 516-526 and (discussion) 526-531, 10 figs. Describes Bellini-Tosi and Robinson systems and installation on aircraft.

Radiogoniometer for. A New Unilateral Radiogoniometer (Un nouveau radiogoniomètre avec levée du dute), E. Bellini. l'Onde Electrique, vol. 3, no. 29, May 1924, pp. 233-253, 19 figs. Describes a new device for direction finding.

DIRIGIBLES. See AIRSHIPS, Dirigibles.

DISKS

Electrification of. The Electrification of Two Parallel Circular Discs, J. W. Nicholson. Roy. Soc. Lond.—Philosophical Trans., vol. 224, no. A623, 1924, pp. 303-369. Mathematical solution of two parallel electrified disks on same axis by harmonic analysis which treats disks as special cases of oblate spheroids, harmonic analysis leading to an integral equation of a new type which is ultimately solved.

Rotating, Calculation of. Calculation of Rotating Disks (Le Calcul des disques tournants), P. Caufourier. Génie Civil, vol. 84, no. 1, Jan. 5, 1924, pp. 15-17, 4 figs. Discusses Prudon, Pigeaud, and Stodola-Arrowsmith methods and describes rational method of employing Arrowsmith calculation.

Rotating, Deformation in. See CYLINDERS, Rotating, Deformation in.

Rotating, Theory of. The Rotating Disk, E. L. Thearle. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 670-674, 9 figs. In Foppl's classical theory of eccentric rotating disk, center of gravity is assumed to lie always in plane of deflected shaft,

and angular acceleration is neglected entirely; solution leads to critical speed, at which shaft deflection becomes infinite; since mechanism such as a De Laval turbine would become inoperative under such conditions, idea of "violent vibration" at critical speed is introduced; author attempts to develop more rational theory by writing down equations of motion of particles of disk in more general form and introducing idea of possible angular acceleration; maximum shaft deflection at critical speed is found to have finite value.

Turbine Bucket Wheels. See STEAM TURBINES, Disks, Protection from Axial Vibration.

DISTILLATION

Columns. Distilling Column Design and Performance. E. H. Leslie. Oil News, vol. 12, no. 1, Jan. 1924, pp. 16-17. Deals with different phases of problems of oil distillation, and design and performance of distillation column.

Distilling Columns (Kolonnenabtreiber-Betrieb), A. Thau. Gas- u. Wasserfach, vol. 67, nos. 3 and 5, Jan. 26 and Feb. 2, 1924, pp. 37-39 and 51-52, 5 figs. Based on experiences with different types of columns, author discusses practical difficulties encountered, peculiarities, causes of trouble and their elimination.

The Efficiency of Fractionating Columns, G. Calingaert and F. E. Huggins, Jr. Indus. & Eng. Chem., vol 16, no. 6, June 1924, pp. 584-586, 2 figs. It is shown that efficiency of packed distilling tower can readily be tested under widely varying operating conditions, by using it as stripping column for dilute ammonia solutions.

Engler. The Effect of Thermometric Lag in Engler Distillation, W. R. Ormandy. Instn. Petroleum Technologists—Jl., vol. 10, no. 43, June 1924, pp. 342-355, 4 figs. Shows by experiments that Engler distillation is greatly at mercy of rather arbitrary source of error and recommends electric measurement of temperature.

Fractional. A New Distillation Method for Simultaneous and Direct Recovery of all Fractions as Chemically Pure Products (Eine neue Destillationsmethode zur gleichzeitigen und unmittelbaren Gewinnung aller Fraktionen als chemisch reine Produkte), V. Freund. Chemiker-Zeitung, vol. 48, no. 104, Aug. 28, 1924, pp. 603-604, 3 figs. Details of apparatus based on leading vapor mixture through dephlegmator in which is cooling liquid whose boiling point is identical with boiling point of vapor ingredient boiling at highest temperature, etc.

Stills. An Experimental Still for the Detailed Study of Crude Petroleum, N. B. Cooke. U. S. Bur. Mines—Reports of Investigations, no. 2632, Aug. 1924, 21 pp., 5 figs. on supp. plates. Design and method of constructing 10-gal. still, by means of which crudes of various types can be distilled under standard conditions and by various methods.

Cylindrical Stills and Pipe Stills Compared, F. N. Williams. Petroleum World, vol. 21, no. 280, Jan. 1924, pp. 31-33. Continuous and batch distillation; uses of pipe still.

Design of Column Stills With Continuous Decanters, G. H. Mains. Chem. & Met. Eng., vol. 31, no. 8, Aug. 25, 1924, pp. 307-311, 5 figs. Lewis equations extended to cover partly miscible liquids and specific application illustrated by calculating design of continuous furfural still.

Distillation and Rectification (Distillation et rectification), L. Gay. Chimie & Industrie, vol. 10, nos. 5 and 6, Nov. and Dec. 1923, pp. 811-828 and 1026-1042, 10 figs. Application of author's heat theory to mixture of gasolene, toluene and metaxylene; general study of ideal solutions; determination of problem of distillation and rectification. Minimum of heat consumption compatible with functioning of apparatus: distilling and rectification problems.

DITCHES

Drainage. See DRAINAGE, Ditches.

DITCHING

Machinery for. See CONSTRUCTION WORK, Machinery for.

DIVING APPARATUS. See BREATHING APPARATUS, Diving.

DIVINING RODS

Problem. The Divining Rod Problem (Zur Frage der Wünschelrute), Ziet. des Internationalen Vereines der Bohringenieure u. Bohrtechniker, vol. 32, no. 20, Oct. 15, 1924, pp. 153-155. Experience with prospecting in North Africa. Attributes divining rod action to physical emanations. Details of apparatus taking place of divining rod and functioning subject to contact with hand, and its successful application.

DOCKS

Calcutta, India. See PORTS, Calcutta, India.

Drydocks. See DRYDOCKS.

Liverpool, England. Mersey Shipping Facilities. Shipbldg. & Shipg. Rec., vol. 24, no. 6, Aug. 7, 1924, pp. 163-168, 10 figs. Progress of new works by Mersey Docks & Harbor Board; Gladstone dock extension; duplication of deep-water entrances to Birkenhead docks; new facilities for oil storage.

The New Gladstone Dock System at Liverpool. Engineering, vol. 118, no. 3054, July 11, 1924, pp. 47-49, 14 figs., partly on supp. plates and p. 54. Docks under construction will complete Gladstone dock system which includes a new river entrance, Gladstone dock itself, and two Gladstone dock branches; system also incorporates Gladstone graving dock, which was completed and put into service in 1913. Main features of whole scheme. Progress of main wet dock works.

Southampton, England. Dock Extensions at Southampton. Engineer, vol. 138, no. 3591, Oct. 24, 1924, pp. 458-460, 2 figs. Discusses proposal for dock-extension scheme which may ultimately involve expenditure of £13,000,000; brief description of existing dock system.

Wharves. See WHARVES.

DOLOMITE

Crystal Structure. The Crystal Structure of Dolmite, R. W. G. Wyckoff and H. E. Merwin. Am. Jl. Sci., vol. 8, no. 48, Dec. 1924, pp. 447-461, 7 figs. Laue photographs show that crystals of dolomite have symmetry of atomic arrangement which is lower than that of calcite; from this it is clear that dolomite is chemical substance distinct from calcite and magnesite.

Production, 1923. See MAGNESIUM, U. S. A.

Refractories, Utilization for. The Utilization of Dolomite for Refractories, G. A. Dole. U. S. Bur. Mines—Reports of Investigations, no. 2627, July 1924, 11 pp. See also Cement, Mill & Quarry, vol. 25, no. 6, Sept. 20, 1924, pp. 31-34. Review of literature and epitome of work done and articles published by Schurecht, Robson and Andrews, in investigation of feasibility of making basic refractories from dolomite, carried on at experiment station of Bur. Mines, at Columbus, Ohio.

DOMES

Masonry. Analytical Solution of Masonry Domes, D. C. Coyle. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 4, Apr. 1924, pp. 401-416, 7 figs.

Investigation to develop analytical formulas for pyramidal and conoidal masonry domes, analogous to equations which have been established for spherical and conical shapes; it is shown that conclusions derived from formulas are those which might be expected; deals with stresses in dome of any profile that is symmetrical about vertical axis.

DOPES

Aircraft. See AIRCRAFT CONSTRUCTION MATERIALS, Dopes.

DRAFT

Boilers. See BOILER OPERATION, Draft Regulation.

DRAFT TUBES. See HYDRAULIC TURBINES, Draft Tubes.

DRAFTING ROOMS

Management of. See MACHINE SHOPS, Drafting-Room Management.

DRAINAGE

[See also RECLAMATION.]

California Stadium Field. Drainage of California Stadium Playing Field, W. W. Weir. Eng. News-Rec., vol. 92, no. 17, Apr. 24, 1924, pp. 714-716, 3 figs. Extensive system of tile drains designed for 24-hr. precipitation exceeding annual rainfall; soil studies precede choice of material overlaying impervious hydraulic fill.

City Areas, Storm-Water Discharge. Storm Water Discharge in City Areas, J. Sarvaas. Indus. Australian & Min. Standard, vol. 71, no. 1851, May 29, 1924, pp. 806-808, 2 figs. Gives formulas and makes calculations. Abstract of paper read before Victorian Inst. Engrs.

Culverts. See CULVERTS.

Ditches. Drainage Construction on Newlands Reclamation Project, A. W. Walker. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 382-386, 8 figs. Conditions under which work of construction of extensive drainage system on Newlands reclamation project in Nevada was done, and methods adopted in order to obtain greatest economy and speed. Serious water-logging of farm lands by irrigation seepage water necessitated rapid construction. Data on effect of drainage system in lowering ground water and in removing salt from alkali soil.

Method of Reconstrucing Old Open Drainage Ditches, J. L. Parsons. Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 77-79, 1 fig. Work of this kind being carried out in Iowa. From Nat. Reclamation Mag.

Open Ditches Replaced by Tile. Nat. Reclamation Mag., vol. 3, no. 3, Mar. 1924, pp. 44-45 and 55, 7 figs. Discussion at Congress in St. Louis shows value of tile replacement for ditches.

Rapid Low-Cost Excavation of Drain Ditches, A. W. Walker. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 426-428, 7 figs. Organization of work by which 150 miles of ditch were built in two years to relieve waterlogging of lands on Newlands reclamation project in Nevada.

South Dakota Drainage Ditches With Flood Gates, P. S. Egbert. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 334-335, 2 figs. Country with slight fall but subject to floods complicates drainage problem. Diked channel through big slough.

Legislation. See IRRIGATION, Legislation, U. S.

Louisiana. Drainage and Flood Control in Louisiana, A. T. Dusenbury. Nat. Reclamation Mag., vol. 3, nos. 6-7, June-July 1924, pp. 122-123 and 129, 5 figs. Considers all classes of reclamation in conservation and development of land.

Pumps, Dutch. See PUMPS, Drainage.

Rainfall and. Drainage and Rainfall, E. V. Willard. Nat. Reclamation Mag., vol. 3, no. 2, Feb. 1924, pp. 24-25 and 34-35. Records show that wet cycles alternate with dry cycles and drainage has no effect on rainfall.

Drainage Development in Its Relation to Wild Animal and Plant Life and Rainfall, E. V. Willard. Min. Federation Architectural & Eng. Societies—Bul., vol. 9, no. 3, Mar. 1924, pp. 14-25, 1 fig. Discusses briefly factors and circumstances which prompted land settlement policies of the nation, and what were the measures of land values used with which land settlement was promoted. Discussion of whether drainage reduces rainfall. Tables giving precipitation records for Minnesota.

Roadbed. Roadbed Drainage and Crossing of Chicago Sewer; I. C. R. R. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, pp. 410-412, 3 figs. Siphon outlet for tile drains; double layer of slabs carries tracks and loads sewer having internal pressure.

Run-Off. Run-off For Open Ditch Land Drainage, C. E. Ramser. Agricultural Eng., vol. 5, no. 10, Oct. 1924, pp. 222-226. Results of run-off investigations made in Lee and Bolivar counties, Mississippi, western Tennessee, and western Iowa.

Silt Handling. Handling Silt in Settling Basins, R. M. Towl. Nat. Reclamation Mag., vol. 3, nos. 6-7, June-July 1924, pp. 116-119, 6 figs. Also Eng. & Contracting (Water Works), vol. 62, no. 2, Aug. 13, 1924, pp. 341-344, 3 figs. How silting problems are being met and results in Hill Creek settling basin.

Storm-Water Drains. The Distribution of Intense Rainfall and Some Other Factors in the Design of Storm-Water Drains, F. A. Marston. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 1, Jan. 1924, pp. 19-46, 12 figs. and (discussion) in nos. 4 and 5, Apr. and May 1924, pp. 543-558 and 660-670, 3 figs. Data showing area covered by excessive rainfall of short duration based on measurements made in Boston Metropolitan Dist., New Orleans, La., and Cambridge, Ohio.

Swamps. Drainage of the Swamp of Piombino (La bonifica del padule di Piombino), S. Minnucci. Annali dei Lavori Pubblici, vol. 62, no. 6, July 1924, pp. 599-613, 8 figs. Discusses hydrographic conditions of River Cornia, silting up of river, drainage work done and to be done.

DRAWINGS

Blueprint System. Drawing Office Blue-print System, R. D. Salmon. Machy. (Lond.), vol. 25, no. 634, Nov. 20, 1924, pp. 237-238, 2 figs. Describes system which has proved thoroughly reliable and easy to maintain.

Drafting-Room Methods. Better Methods in the Drafting Room, J. Flodin. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 293-296. Problems of chief draftsman; taking care of file or reference prints; issuing and keeping proper account of prints; method of recording patterns and dies; etc.

Preparation and Use. Working Drawings, B. Moore. Elec. Jl., vol. 21, no. 10, Oct. 1924, pp. 483-486, 2 figs. Functions, classes, preparation, machining limits, and use of drawings.

Tool-Drafting Records. Tool Engineering, A. A. Dowd and F. W. Curtis. Am. Mach., vol. 60, no. 16, Apr. 17, 1924, pp. 591-593, 4 figs. Records necessary in tool-drafting room; time and progress records; supervision of drafting room.

DREDGES

British Types. Some Recent British Dredgers. Engineer, vol. 138, no. 3599, Dec. 19, 1924, pp. 694-696, 6 figs. Describes examples of dredgers shown in model form at Wembley Exhibition, built by three Scottish firms, including suction type, dipper dredger, and rock cutter.

Bucket. New Bucket Dredge for Emden (Ein neuer Eimerbagger für Emden), Paulmann. Zeit. für Bauwesen, vol. 74, no. 4-6, 1924, pp. 31-33, 10 figs. partly on supp. plate. Design and construction of a dredge embodying all improvements derived from experience; capacity 500 cu. meters sand per hour of 1.8 sp. gr.; efficiency during 3-hour test was 650 cu. meters of 2.05 sp. gr.

Cable. Earth and River Operations by Cable Dredges (Erd- und Flussbauten durch Kabelbagger), F. Riedig. Bautechnik, vol. 2, no. 50, Nov. 21, 1924, pp. 568-569, 4 figs. Details of systems of cable dredges with parallel moving towers, and with fixed winch tower and radially movable smaller tower, and their operation.

Diesel-Electric. Diesel-Electric Dredge A. Mackenzie Completes Trials. Mar. Eng. and Shipg. Age, vol. 29, no. 7, July 1924, pp. 409-411, 14 figs. Particulars of first of four new diesel-electric sea-going dredges for U. S. Army.

Diesel-Electric Hopper Dredge for U. S. Army. Motorship, vol. 9, no. 7, July 1924, pp. 497-502, 15 figs. Particulars of "A Mackenzie," sea-going dredge of suction type. Electric transmission from three 1000-b.hp. Diesel engines furnishes propelling power and operates dredging pumps. Flexibility, economy, and modern equipment characterize this vessel.

Diesel-Electric Operation of Gold Dredges in Alaska, H. J. Gallagher. Oil Engine Power, vol. 2, no. 6, June 1924, pp. 312-314, 6 figs. 1575-b.hp. power plant furnishing current to dredges was placed in service in 1923 and duplicate order followed in 1924; Diesel power enables practically all-year-round work to be carried on.

Large Diesel-Electric Dredge for West Coast. Motorship, vol. 9, no. 6, June 1924, pp. 442-444, 2 figs. Particulars of Port of Portland Commission's steel-hull 30-in. suction dredge, developing a total of 3400 b.hp. and removing 50,000 cu. yd. per day.

See also Sea-Going.

Gold. See Diesel-Electric.

Harbor. Harbour Plant. Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 546-549, 23 figs. partly on supp. plates. Examples of floating cranes, dredges, and rock breakers exhibited at Brit. Empire Exhibition.

Hopper. See Diesel-Electric Sea-Going.

Hydraulic. High-Lift Hydraulic Dredge Has Toothed Gutter Head, V. J. Milkowski. Eng. News-Rec., vol. 92, no. 24, June 12, 1924, pp. 1016-1017, 4 figs. Designed for deep digging and long discharge in Welland River canalization of Chippawa power canal.

Oil-Engined. Design Oil Type Harbor Dredge. Mar. Rev., vol. 54, no. 7, July 1924, pp. 289-292, 12 figs. Particulars of dipper dredge "Hell Gate" of U. S. Engineer Corps.

Oil-Engine Dredge of Tennessee-Arkansas Gravel Co. Rock Products, vol. 27. no. 17, Aug. 23, 1924, pp. 25-26, 5 figs. Details of construction of tug "Virginia" equipped with 165 hp. three-cylinder Anderson oil engine; describes pumping plant of Tenessee-Arkansas Gravel Co.

Sea-Going. All-Electric Sea-Going Hopper Dredges, H. C. Coleman. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 438-442, 8 figs. Describes hydraulic-type hopper dredge which is self-propelled vessel with molded hull similar to that of ordinary ocean cargo ship; first of this type ever built, A. Mackenzie, is in active service in New York harbor.

Army Engineers Build Four Seagoing Electric Dredges. Eng. News-Rec., vol. 93, no. 2, July 10, 1924, pp. 57-59, 5 figs. All-electric operation even to smallest service. Every dredge movement controlled from pilot house. Three 1000-hp. Diesel engine generating units operate 800-hp. propeller and pump motors.

First Diesel-Electric Army Dredge Completed. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 230-233, 7 figs. Particulars of the A. Mackenzie, seagoing hopper dredge of radically new type for harbor service; electricity used for propulsion and operation; length, overall, 268 ft. 5 in.; breadth, molded, 46 ft.; depth, molded, 22 ft. 6 in.; deadweight, 2000 tons on draft of 19 ft. 6 in.

Hydraulic Seagoing Hopper Dredges, W. D. Styer. Soc. Nav. Architects & Mar. Engrs.—Advance paper no. 2, for meeting Nov. 13-14, 1924, 18 pp., 23 figs. on supp. plates. Historical development; method of operation; advantages of type for bar dredging; different types; performance; description of most recent designs. See (abstract) in Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 728-729.

New Electric Federal Suction Dredge, W. D. Styer. Dredging Eng., vol. 1, no. 1, Dec. 1923, pp. 5-7, 4 figs. Describes the A. Mackenzie, new type sea-going hopper dredge built for U. S. Eng. Dept., first of four; power unit consists of three 1000-b.hp. Diesel engines each direct connected to a 700-kw. 500-volt d.c. generator, and two auxiliary 225-b.hp. Diesel engines direct connected to a 150-kw. 250-volt d.c. generator.

See also Diesel-Electric.

Suction. A Twin-Screw Light-Draught Rotary Suction Dredger for Bombay. Shipbldg. & Shipg. Rec., vol. 24, no. 8, Aug. 21, 1924, pp. 227-228, 1 fig. Tendering particulars of twin-screw self-propelling suction cutter dredgers for service in Lloyd barrage construction; proposed dimensions are, length, 220 ft.; breadth, 45 ft.; depth, molded, 7 ft. 6 in.; speed, 9 m.p.h.

Types. Dredging Apparatus Used in the Brisbane River, W. T. Evans. Commonwealth Engr., vol. 11, no. 10, May 1, 1924, pp. 392-395. Describes various types of dredging apparatus used and details of machinery.

DREDGING

Gold. Gold Dredging in Central Otago, New Zealand. Chem. Eng. & Min. Rev. vol. 16, no. 192, Sept. 5, 1924, pp. 473-475, 1 fig. History of dredging in district.

Gold-Dredging in New Zealand. Times Trade & Eng. Supp., vol. 14, no. 298, Mar. 22, 1924, p. 46. Plan for damming of Lake Wakatipu outlet.

Levee Work. See LEVEES.

Reclamation and. See RECLAMATION, Dredging and.

DRIERS.

[See also EVAPORATORS, Types.]

Calculation. Graphic Determination of Required Heating Surface of Pipe and Plate Dryers (Die graphische Ermittlung der erforderlichen Heizflächen von Röhren- und Tellertrocknern, sowie der Leistungsverhältnisse der einzelnen Apparate), Kegel. Braunkohle, vol. 23, nos. 30 and 31, Oct. 25 and Nov. 1, 1924, pp. 553-556 and 574-579, 6 figs. Develops formulas for a simple graphic method of calculation assuring a constant temperature of evaporation, and gives practical examples.

Ceramic Materials. See CERAMIC MATERIALS, Driers for.

DRILLING

Automobile Parts. Drilling Operations on Automobile Parts, H. L. Tigges. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 109-111, 7 figs. Gives a number of examples of work performed in automobile plants on heavy-duty drilling machines built by Baker Bros., Inc., Toledo, Ohio, speeds and feeds used for each job and production obtained being mentioned in each case.

Deep-Hole. Deep-Hole Drilling in Large Lathe. Iron Age, vol. 113, no. 6, Feb. 7, 1924, pp. 419-421, 7 figs. Success in drilling printing-machine rolls attributed to boring bar; describes machining of rolls; special milling attachments developed.

See also MACHINING METHODS, Blueprints, Elimination of.

Diamond. Diamond Drilling Under Difficulties, R. P. McGrath. Eng. & Contracting (Water Works), vol. 61, no. 1, Jan. 9, 1924, pp. 95-99, 5 figs. Selection of locations for dams, bridges, and other engineering structures by means of preliminary test borings made with diamond core drills. Describes ingenious methods on three western jobs. From Mine & Quarry, Nov. 1923.

Diamonds for. See DIAMONDS, Drill.

Heavy-Duty. Examples of Heavy-Duty Drilling and Boring, H. L. Tigges. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 46-48, 7 figs. Operations on automobile cylinder blocks, pistons, crankshafts, and spring seats.

Jack-Hammer. Improvements in Drilling Efficiency With Jack-Hammers, P. M. Newhall and L. Pryce. S. African Instn. Engrs.—Jl., vol. 22, no. 8, Mar. 1924, pp. 114-133 and (discussion) 133-136, 11 figs. Details of investigation, primary object of which was to find out whether it might be possible to take some measures toward standardization of rock drills and their equipment, thus reducing number of types and patterns on each mine, and simplifying question of variety and quantity of spare parts required. Comparison between footage drilled per shift in 1923 with 50-lb. wet jack-hammer with that obtained with dry jack-hammer and hollow steel in 1920, giving fair measure of total improvement brought about during period that these investigations have been in progress.

Oil Wells. See OIL WELLS, Drilling.

Resistance of Metals to. See METALS, Machining Qualities.

Rotary. Rotary Drills in Mining Exploration (La sonda giratoria en las exploraciones mineras), J. E. Harding. Ingenieria Internacional, vol. 12, no. 5, Nov. 1924, pp. 224-227, 5 figs. Discusses methods and records for collecting and classifying data obtained from analysis of core samples.

DRILLING MACHINES

Angle-Plate Fixture. Universal Angle-plate Drilling Fixture. Machy. (Lond.), vol. 24, no. 610, June 5, 1924, pp. 315-316, 3 figs. Use and general application of universal drilling fixture for handling casings for turbines.

Angular Settings for. Angular Settings for Drilling and Boring. Mech. Wld., vol. 75, nos. 1943, 1945, and 1948, Mar. 28, Apr. 11 and May 2, 1924, pp. 190-191, 222, and 270-271. 16 figs. Describes various methods of angular setting.

Boiler-Shop. Economic Drilling Work in Boiler Shops (Wirtschaftliches Bohren in der Kesselschmiede), P. Naumann. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 894-896, 5 figs. Discusses principles for construction of drilling machines and describes a two-spindle machine designed accordingly.

Continuous. Langelier Continuous Drilling Machine. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, p. 317, 1 fig. Ten-spindle rotary machine designed primarily for drilling tapped hole in nuts used on hub of automobile disk wheels, but which can easily be arranged to drill other parts of similar form.

Design. A Study of Drilling Machines, Jos. G. Horner. Machy. (Lon.), vol. 25, no. 636, Dec. 4, 1924, pp. 297-298. Details of design and developments, with reference to geared speeds and feeds, high-speed steel, spindles, tables, etc.

Development. Fifty Years Development in Drilling Machines. Machy, (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 352-354, 2 figs. Comparison between early and present-day designs of upright and radial drilling machines.

Fifty Years of Drilling Machine Specialization. Am. Mach., vol. 60, no. 1, Jan. 3, 1924, pp. 21-23. See also Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 61-65. Drilling-machine history of past half century of Cincinnati Bickford Tool Co.; contrast between machines and performances of former years and today.

Drilling and Milling. Drilling and Milling Work in Large-Scale Machine Construction (Bohr- und Fräswerke im Grossmaschinenbau), A. Schlegelmilch. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 34, Aug. 23, 1924, pp. 865-871, 18 figs. Details of new combined drilling and milling plant of Schiess Machine Works at Düsseldorf and comparative advantages.

Electric. Electric Hand Drilling Machines in Steel-Construction Workshops, Especially in Shipyards (Die elektrische Handbohrmaschine in Eisenkonstruktionswerkstätten, insbesondere auf Werften), H. Gütschow. Praktischer Maschinen-Konstrukteur (Deutsche Werkzeugmaschinenbau), vol. 57, no. 1-2, Jan. 8, 1924, pp. 7-10, 8 figs. Describes preliminary work for introduction of such machines in shipyard in Danzig, including comparative tests on pneumatic and electric drilling machines, showing superiority of latter.

Electric and Compressed-Air, Comparison of. Comparative Tests of Electric and Compressed Air Hand Drilling Machines (Vergleichsversuche zur Ermittlung der Wirtschaftlichkeit von elektrischen und Pressluft-Handbohrmaschinen), E. Pallas. Maschinenbau, vol. 3, no. 22, Aug. 28, 1924, pp. 814-817, 9 figs. Advantages and drawbacks, economic comparison, results of experiments, formula for determining coefficient of efficiency and economy.

Economics of Compressed-Air Drilling Machines (Einiges über die Wirtschaftlichkeit von Pressluftbohrmaschinen), G. Salinger. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 896-897, 3 figs. Comparison with electric drilling machine; increasing efficiency of pneumatic machine; substituting gliding by rolling friction; shows superiority of roller bearings.

Heavy-Duty, Possibilities of. Possibilities of Heavy-duty Drilling, H. L. Tigges. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 950-952, 5 figs. See also Machy. (Lond.), vol. 24, no. 624, Sept. 11, 1924, pp. 737-739, 5 figs. Points out possibilities of vertical heavy-duty drilling machine by presenting examples of work done in automobile plants. By term "heavy-duty drilling machine" is meant a machine with a box column.

Multiple-Spindle. Multiple-spindle Drilling Machines. Machy. (Lond.), vol. 23, no. 593, Feb. 7, 1924, pp. 609-612, 6 figs. New tools operating on time cycle, more particularly for operation on railway-car details.

Radial. A New Portable Universal Radial Drilling Machine. Eng. Production, vol. 7, no. 140, May 1924, pp. 144-145, 4 figs. Describes drilling and tapping machine of Wm. Asquith, Ltd., Halifax.

Locomotive-Frame Drilling Machines (Lokomotivrahmen-Bohrmaschinen), E. Stephan. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 897-899, 6 figs. Advantages of drilling over cutting

and punching; operation of frame-drilling machines; simultaneous drilling of several frames; etc.

New 6-ft. Radial Drilling Machine. Machy. (Lond.), vol. 24, no. 610, June 5, 1924, pp. 305-306, 1 fig. High-speed radial drilling, boring, facing tapping, and studding machine, constructed by Geo. Swift & Sons, Halifax.

Radial, Manufacture of. Manufacturing the Right Line Radial Drill, J. Haydock. Am. Mach., vol. 61, nos. 13 and 14, Sept. 25 and Oct. 2, 1924, pp. 495-498 and 543-545, 15 figs. Sept. 25: Deals with planing, milling, and drilling operations on the heavier parts. Oct. 2: Gear cutting, scraping, and assembling.

Rotating Tables. Drilling Motor Parts on the Rotating Table, W. F. Sandmann. Am. Mach., vol. 60, no. 6, Feb. 7, 1924, pp. 197-199, 6 figs. Examples of rotating fixtures used on large variety of automotive work; construction of fixtures and principles involved in design.

Slot. A New Duplex Slot Drilling Machine. Machy. (Lond.), vol. 24, no. 620, Aug. 14, 1924, pp. 627-628, 3 figs. Describes latest duplex slot drilling and keyseating machine built by Smith & Coventry, Ltd., Salford, Eng.; convenience of operation and compactness of design, combined with accessibility of all adjustments, are prominent features. Has single belt drive.

Types. Plate and Bar-working Tools. Machy. (Lond.), vol. 23, nos. 596 and 598, Feb. 28 and Mar. 13, 1924, pp. 713-718 and 777-784, 34 figs. Drilling machines and practice.

Vertical. See Heavy-Duty.

DRILLS

Grinding. See ABRASIVE WHEELS, Selection and Uses.

Portable, Electric. Summary of Conditions for Judging Portable Electric Drills (Zusammenfassung aller Bedingungen für die Bewertung ortsbeweglicher Elektro-Bohrmaschinen, sogenannter Handbohrmaschinen und deren Verwendungsgebiete), H. Sundhaussen. Kruppsche Monatshefte, vol. 5, Aug.-Sept. 1924, pp. 157-167, 17 figs. and 2 tables on supp. pages. Details of various types of drills, their design, construction, and operation.

Rock. See ROCK DRILLS.

Steel for, Defects in. Physical Defects in Hollow Drill Steel, F. B. Foley, Chas. Y. Clayton and M. L. Frey. Am. Inst. Min. & Met. Engrs.—Trans., no. 1317-S, Mar. 1924, 13 pp., 6 figs. Mine drill steels were examined to detect cause of prevalence of failures at bit end of short steels of large gage at particular mine; transverse cracks along water hole were found; new steels are found to contain very few actual cracks but surface of water hole is uneven, and in used steels cracks seem to originate at base of such undulations or serrations; these irregularities are thought to be predisposing cause of cracks.

DROP FORGING

Costs, Relation to Operation. Relation of Drop Forge Costs to Percentages of Operation, R. T. Herdegen. Forging—Stamping—Heat Treating, vol. 10, no. 11, Nov. 1924, pp. 405-409, 1 fig. Data compiled from various forge shops.

Crankshafts. Precautions Needed in Production of Automotive Drop Forgings. Automotive Industries, vol. 50, no. 26, June 26, 1924, pp. 1388-1391, 6 figs. Wyman-Gordon employ special machine to prove running balance of crankshafts, and etch section to show direction of flow in finished product, in addition to standard tests.

Dies. See DIES, Drop-Forging.

Drop Stamps. Drop Stamps with Multiple Impression Dies. Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 705-706, 2 figs. Describes battery of drop stamps introduced by Brett's Patent Lifter Co., to be used for production of parts of railway appliances; novelty of installation consists in arrangements made for use of multiple-impression dies.

Hammers. See HAMMERS.

Piece-Rate Prices. Maintaining Proper Piece Rate Prices, L. J. Stoddard. Forging—Stamping—Heat Treating, vol. 10, no. 12, Dec. 1924, pp. 446-447. Points out that ability to correctly estimate given weight of pieces to be forged, and production per hour, and to properly apportion cost is essential to success.

Practice. Drop Forging, B. Brett. Eng. Production, vol. 7, no. 146, Nov. 1924, pp. 337-340, 6 figs. Description of work produced; features in design and application of drop-forging equipment; multiple die stamping, and design of hammer specially brought out for application of this system of drop forging, furnaces for drop forging.

Research, Importance of. The Drop Forge Industry as the Buyer Sees It, C. E. Bement. Forging—Stamping—Heat Treating, vol. 10, no. 12, Dec. 1924, pp. 452-454. Points out that lack of research and investigation on important phases of drop-forging practice is contributing factor in retarding normal development.

Trimming Flash. Drop Forge Practice—Trimming the Flash, L. Aitchison. Forging—Stamping—Heat Treating, vol. 10, nos. 3 and 4, Mar. and Apr. 1924, pp. 102-105 and 148-152 and 172, 21 figs. Discusses factors that must be taken into consideration in trimming flash from drop forgings; proper design of trimming tools essential.

DRYDOCKS

East Boston, Mass. The Simpson Dry Dock Plant. Shipbldg. & Shipg. Rec., vol. 24, no. 11, Sept. 11, 1924, p. 311, 1 fig. Gives general layout and improvements carried out at Simpson Dry Dock Plant, East Boston, Mass.

Esquimalt, B. C. The Canadian Government Dry Dock at Esquimalt, B. C. Engineering, vol. 138, no. 3065, Sept. 26, 1924, pp. 449-450, 33 figs. partly on supp. plate and p. 454. Description of new dock being constructed, which will accommodate largest class of ships, a depth over sill at high tide of 40 ft. being provided, while maximum usable length will be 1150 ft.

Floating. An Interesting Floating Dry Dock. Pac. Mar. Rev., vol. 21, no. 9, Sept. 1924, p. 463, 3 figs. Describes new 15,000-ton floating drydock being built for Wallace Shipbldg. & Drydock Co., Ltd., Vancouver, B. C.; dock will consist of 11 timber pontoons, four in small section and seven in large.

Floating Drydock at Vancouver. Can. Engr., vol. 47, no. 16, Oct. 14, 1924, pp. 422-423, 1 fig.

New Floating Dry Dock for Southampton. Engineer, vol. 137, no. 3556, Feb. 22, 1924, pp. 198-199, 9 figs., partly on supp. plate. Shows progress of work and launching of individual sections.

Reinforced Concrete Dolphins for 60,000-Ton Floating Dock at Southampton. Concrete & Constructional Eng., vol. 19, no. 7, July 1924, pp. 450-454, 1 fig. To provide docking facilities for ships of Majestic type and larger (56,557 tons).

The Southampton 60,000-Ton Floating Dock. Engineering, vol. 117, no. 3051, June 20, 1924, pp. 789-791, 23 figs. partly on supp. plates. Detailed description of dock provided by Southern Ry. to enable even largest vessels in world, viz., the Majestic and the Leviathan, using port to be repaired and overhauled. Total weight of structure and equipment is 18,800 tons. Dock is of double-sided, self-docking type constructed in seven

sections, any one of which can be lifted by others for painting or repairs.

Havre, France. The New Dry Dock at Havre. Engineer, vol. 137, no. 3572, June 13, 1924, pp. 662-663, 6 figs. Dock has length of 312 m., and free width at entrance of 38 m.; it is composed of steel and concrete and was erected on land, floated, towed to site it was to occupy, and then gradually sunk on to previously dredged foundation by building masonry inside it, so as to form walls and floor of dock.

See also QUAYS, Tidal Basin, Havre, France.

Italy. The Drydock "Principe di Piemonte" of the Royal Arsenal at Venice (Bacino da carenaggio "Principe di Piemonte" del R. Arsenale di Venezia), F. Ferreri. Annali dei Lavori Pubblici, vol. 62, no. 8, Aug. 1924, pp. 709-730, 20 figs. on supp. plates. Details of construction and equipment.

Liverpool. See DOCKS, Liverpool.

Oil Engines for. Stationary Oil Engines for Dry Docks. Oil Engine Power, vol. 2, no. 12, Dec. 1924, pp. 641-643, 3 figs. Sets forth advantages of employing oil engines to furnish power for operation of drydocks; details of construction, launching, and delivery of 8000-ton floating drydock ordered by company in Batavia, Java, from Burgerhout's Eng. & Shipbldg. Works, Rotterdam.

Swansea, England. The New Palmer's Graving Dock at Swansea. Engineering, vol. 117, nos. 3045 and 3046, May 9 and 16, 1924, pp. 602-604 and 610, and 637-640, 26 figs. See also Engineer, vol. 137, nos. 3568 and 3569, May 16 and 23, 1924, pp. 544-546 and 576-577, 6 figs. Account of new dock and its equipment and detailed consideration of constructional work; built entirely of concrete except quoin and sill stones, which are of granite.

DRYING

Air Heaters for. See AIR HEATERS.

Driers. See DRIERS; REFRACTORIES, Drying.

Intensive, Influence of. The Influence of Intensive Drying on Internal Change (Ueber den Einfluss intensiver Trocknung auf innere Umsetzungen), A. Smits. Zeit. für Physikalische Chemie, vol. 111, no. 3-4, Aug. 5, 1924, pp. 161-170. Explanation of properties of intensively dried substances based on theory of allotropy, substance being assumed to contain at least two different molecular forms in internal equilibrium, at least one of these forms being inactive.

Principles and Methods. Drying Methods in Modern Industrial Processes, Chas. L. Hubbard. Nat. Engr., vol. 28, no. 7, July 1924, pp. 309-314, 7 figs. Fundamentals of drying processes and basic factors affecting their operation.

Principles and Methods of Drying in Modern Industrial Processes, C. L. Hubbard. Nat. Engr., vol. 28, no. 11, Nov. 1924, pp. 543-547, 9 figs. Discussion of the different methods used in drying processes and their relative advantages and applications.

Textile Mills. See TEXTILES, Drying Apparatus.

Vacuum. Drying in Vacuum (Torkning i vakuum), A. Estelle. Teknisk Tidskrift, vol. 54, no. 41, Oct. 11, 1924, pp. 77-78 (Kemi), 3 figs. Describes system of drying of wood in vacuum invented by P. H. Mueller.

Drying in Vacuum (Torkning i vakuum), E. Oeman. Teknisk Tidskrift, vol. 54, no. 37, Sept. 13, 1924, pp. 65-69 (Kemi), 3 figs. Analyzes process and principles of drying in vacuum.

Vacuum Wood-Drying Process of Swedish Origin. Swedish Export, vol. 8, no. 1, Jan. 1924, pp. 7-8, 2 figs. Special reference to installation of some plants on Forselles' high-vacuum system.

Waste-Heat. See WASTE HEAT, Drying with.

Wood. See WOOD, Drying.

DRYING PLANTS

Wood. Wood-Drying Plants for Shipyards (Holztrocknungs-Anlagen für Schiffswerften), F. Kleiber. Schiffbau, vol. 25, no. 10, Feb. 27, 1924, pp. 247-249, 3 figs. Describes Daqua artificial wood-drying system and plant.

DURALUMIN

[See also AIRCRAFT CONSTRUCTION MATERIALS, Light Metals; ALUMINUM ALLOYS, Steel vs.]

Improvement Process. The Researches on the Duraluminum Problem, W. Fraenkel and E. Scheuer. Testing, vol. 1, no. 1, Jan. 1924, pp. 33-39. Explains peculiarity of process of improvement, and gives hypothesis reached by authors, namely, that cause of improvement is explained as chemical reaction in quenched alloy taking place in forming solid solution.

Production and Uses. Duralumin, Its Composition and Treatment, S. H. Phillips. Am. Mach., vol. 61, no. 10, Sept. 4, 1924, pp. 371-374, 5 figs. Data concerning production and uses.

Properties and Uses. Duralumin (Duralumin), R. Beck. Zeit. für Metallkunde, vol. 16, no. 4, Apr. 1924, pp. 122-127, 2 figs. Its properties and uses; refining process.

Treatment. Duralumin, How It Is Treated, Handled and Protected Against Corrosion, H. C. Knerr. Automotive Industries, vol. 51, no. 15, Oct. 9, 1924, pp. 648-650. Instructions for working cover forming, bending, tube bending, spinning, forging, riveting, welding, and soldering; condensed data given on composition, mechanical properties, and heat treatment.

Welding. See ELECTRIC WELDING, Resistance, Spot.

DUST.

Atmospheric. Dust in the Atmosphere. Nature (Lond.), vol. 114, no. 2872, Nov. 15, 1924, pp. 720-722, 3 figs. Methods of estimating atmospheric impurity; effects of impure air. (Abstract.) Report of Advisory Committee on Atmospheric Pollution.

Investigation of the Dust Content of the Atmosphere, H. H. Kimball, I. F. Hand, N. Shaw, and E. R. Miller. Monthly Weather Rev., vol. 52, no. 3, Mar. 1924, pp. 133-141, 17 figs. Series of papers on experiments with Owen's dust counter, organic bodies found in air of Washington and London; dust fall of Mar. 29, 1924.

See also AIR, Dustiness Measurement.

Coal. See COAL DUST.

Collection. A Dust Collecting System, B. E. Whitesell. Am. Ceramic Soc.—Jl., vol. 7, no. 3, Mar. 1924, pp. 77-82, 8 figs. Describes principle on which a dust collecting system installed at Salina Plant of Kier Fire Brick Co., Pittsburgh, Pa., operates; factors considered in designing, and description of installation and operation.

A Flue Dust Collector. Power Engr., vol. 19, no. 221, Aug. 1924, pp. 291-292, 2 figs. Describes method of trapping flue dust at base of steel chimneys, instead of allowing it to escape from chimney top.

Collecting Flint Dust, A. E. Harris. Ceramic Soc.—Trans., vol. 23, Pt. 1, 1924, pp. 26-32 and (discussion) 32-38, 5 figs. Methods and equipment.

Dust Collecting Plants for Briquetting Works (Entstaubungsanlagen für Brikettfabriken), M. Kessner. Feuerungstechnik, vol. 12, no. 18, June

15, 1924, pp. 150-152, 3 figs. Describes plant collecting coal dust which is used for firing as pulverized coal, constructed by Demag, Duisburg.

Electric Dust Collection in the Cement Industry (Die elektrische Gasreinigung im Dienste der Zementindustrie), H. Nitzsche. Tonindustrie-Zeitung, vol. 48, no. 48, June 14, 1924, pp. 517-520, 8 figs. Discusses Cottrell-Möller process and apparatus for it made by Lurgi-Apparatebau G.m.b.H. in Frankfurt, their advantages and application in cement works.

Industrial Dust Collecting and Ventilating (Die Bedeutung zeitgemässer Entstaubung und Entlüftung in der Industrie), E. Schumann. Rauch u. Staub, vol. 14, Sept. 22, 1924, pp. 96-99, 8 figs. Discusses dust removal and ventilation in various kinds of factories from sanitary standpoint and gives examples.

Counter. See Atmospheric.

Explosion Prevention. Safety in Grinding Sulphur and Hard Rubber, H. W. Frevert. Chem. & Met. Eng., vol. 31, no. 23, Dec. 8, 1924, pp. 894-896, 4 figs. Operating in atmosphere containing less than 8.5 per cent ozygen with sulphur and less than 13 per cent oxygen with hard rubber will bring about danger of dust explosions.

Explosions. A Peculiar Dust Explosion, W. A. Noel. Chem. & Met. Eng., vol. 31, no. 6, Aug. 11, 1924, pp. 223-225, 6 figs. Investigation of causes and possible origin of dust explosion in spray drier used on milk.

Dust Explosions (Die Staubexplosionen), G. Jaeckel. Zeit. für Technische Physik, vol. 5, no. 3, 1924, pp. 67-78, 3 figs. Discusses causes; thermal explosions and electric explosions; gives theory of propagation of dust explosions which enables calculation of upper and lower explosion limits of dust from its thermal constants, etc.

Electric Plants in Dustladen Spaces (Elektrische Anlagen in stauberfüllten Räumen). Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 13, July 15, 1924, pp. 113-114. Details of explosion of aluminum dust at bronze factory favored by slight defects in electric lines.

The Lower Limits of Concentration for Explosion of Dusts in Air, L. J. Trostel and H. W. Frevert. Chem. & Met. Eng., vol. 30, no. 4, Jan. 28, 1924, pp. 141-146, 5 figs. Recounts tests made at Bur. of Chemistry, Dept. of Agriculture, and interprets results in light of industrial needs.

See also COAL DUST, Explosions; EXPLOSIONS, Lignone Dust; Starch Dust; Sugar Dust.

Flour, Explosions of. See GRAIN ELEVATORS, Explosions.

Inhalation, Effect of. The Inhalation of Dust, H. M. Carleton. Colliery Guardian, vol. 128, no. 3331, Oct. 31, 1924, pp. 1127-1128. Abstract of report to Medical Research Council. Author combats commonly held view that harmfulness of dust can be measured by degree of angularity and sharpness of particles; experiments confirm opinion that inhalation of coal dust may have beneficial results and that dangers arising from inhalation of shale dust are very small.

Precipitation, Electrical. Dust Precipitation by Means of High-Tension Current (Niederschlagung von Staub durch Elektrizität von hoher Spannung), H. Kalpers. Elektro-Jl., vol. 4, no. 8, Aug. 1924, pp. 219-220. Industrial dust precipitation with current up to 100,000 volts; glass and other protective coverings for active electrodes and their efficiency.

The Electrostatic Precipitation of Suspended Particles from Gases, H. C. Urquhart and K. I. Marshall. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 223-239, 4 figs. Discusses history of electric precipitation, theory of electrostatic precipitation process, by passing dust between two suitably shaped electrodes charged with high potential unidirectional electricity; plate and pipe types of precipitators, application and results.

See also Removal; PRECIPITATION, Electrical.

Protection Against. Protection Against Dust and Fumes, R. C. Williams. Forging—Stamping—Heat Treating, vol. 10, no. 4, Apr. 1924, pp. 164-167, 1 fig. Examples of practical results in accident and sickness prevention demonstrates what it is possible to accomplish if careful methods are utilized.

Removal. Dust Extraction in the Cotton Industry, J. H. Crabtree. Power Engr., vol. 19, no. 218, May 1924, pp. 169-171, 7 figs. Describes several systems actually at work in mills.

Dust Removal and Gas Purification by Means of Electricity (Entstaubung und Gasreinigung durch Elektrizität), E. Zopf. Montanistische Rundschau, vol. 16, no. 6, Mar. 16, 1924, pp. 135-138, 3 figs. Description of Cottrell-Möller electric process, according to which gases are conducted through a high-tension electric field, carrying pulsative direct current of about 50,000 volts. Metal dust, vapor, and smoke-containing gases are completely purified by this process. Hundreds of successful installations in Germany.

See also GASES, Dust Removal.

Separators. See AIR FILTERS, Dust Separators.

DYE INDUSTRY

Great Britain. British Dyestuffs Industry, F. E. Breithut. Trade Information Bul. (Supp. to Commerce Repts.), no. 231, May 19, 1924, 30 pp. Particulars of factories making dyestuffs, dyestuffs, dyestuffs (import regulation) act of 1920, reparation dyes, status of industry, quality of dyestuffs, prices, and proposed Anglo-German dye agreement.

Review and Criticism of British Dyestuff Industry, H. Levinstein. Chem. Age (Lond.), vol. 11, no. 278, Oct. 11, 1924, pp. 364-367. Author's views on situation and a frank criticism of position of British Dyestuffs Corpn.

Status of the Dye Industry in Great Britain, F. E. Breithut. Chem. & Met. Eng., vol. 30, no. 22, June 2, 1924, pp. 869-970. Economic factors responsible for its development and present tendencies.

The British Dyestuff Industry as Seen by a Neutral, H. A. Prager. Chem. Age (Lond.), vol. 11, no. 287, Dec. 13, 1924, pp. 594-596. Present position and ways of reconstruction.

Italy. The Dye Industry in Italy and the New Processes Developed for Manufacturing Some of the Most Important Intermediate Products (L'industria delle materie coloranti in Italia ed i nuovi processi per la fabbricazione di taluni dei grandi prodotti intermediari), G. Poma. Giornale di Chimica Industriale ed Applicata, vol. 6, no. 3, Mar. 1924, pp. 111-120, 12 figs. Description of radically new and successful processes developed.

Post-War Development. The Dyestuff Industry (L'Industrie des matières colorantes), A. Wahl. Technique Moderne, vol. 16, no. 10, May 15, 1924, pp. 341-349, 9 figs. Review of developments since the war in France, Germany, Switzerland, England, and United States.

Switzerland. The Swiss Dyestuffs Industry, F. E. Breithut. Trade Information Bul. (Supp. to Commerce Repts.), no. 175, Jan. 14, 1924, 16 pp. Production, export, and import statistics.

United States. American Progress in Dye Manufacture, Chas. H. Herty. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1021-1023, 1 fig. Account of progress; list of new dyestuffs announced since Tariff Act of 1922.

Dye Symposium. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924. Contains following articles: Early Attempts to Establish the Analine Industry in United States, V. G. Bloede, pp. 409-411; Record of the Coal-Tar Color Industry at Albany, E. Hendrick, pp. 411-413; American Dyestuffs, Geo. A. Prochazka, pp. 413-417; Washington's Relation to the Dye Industry Prior to 1914, Chas. E. Munroe and A. M. Doyle, pp. 417-419.

DYEING

Jig Dyeing Machines. Jig Dyeing Machines, R. Sansone. Textile Wld., vol. 66, no. 17, Oct. 25, 1924, pp. 107, 109 and 111, 6 figs. An Italian viewpoint on possible future developments. Detached dye vat. Electrical applications.

Mineral Pigment, Use of. Use of Mineral Pigment in Dyeing, J. M. Matthews. Color Trade Jl., vol. 14, no. 2, Feb. 1924, pp. 37-41. Necessity of obtaining mineral compounds in some soluble form for use as dyes; features to be guarded against in use of mineral dyes; application of mineral dyes; etc.

Turkey Red. Comparison of Methods for Dyeing Turkey Red (Contribution à l'étude du rouge Alizarine teint), Chas. Sunder. Société Industrielle de Mulhouse—Bul., vol. 90, no. 1, Jan. 1924, pp. 72-79. Review of methods in which fabric is mordanted, before dyeing, with oil and alumina or with alumina and then oil, or is mordanted after dyeing (padding) with Alizarin.

Wool. Classification of the Methods of Dyeing Wool, J. M. Matthews. Color Trade Jl., vol. 14, nos. 3 and 5 and vol. 15, no. 1, Mar., May, and July, 1924, pp. 77-81, 141-145, and 7-9. Nature of wool fiber; dyeing directly with basic and substantive dyes; diluents used with dyestuffs and their effect on dyeing; requirements of dyes for household dyeing; dyeing in a weekly acid bath; dyeing with sulfone dyes by addition of chrome and bluestone; archil an important wool dye; etc. Processes involving use of an alkaline bath.

DYES

Action of Light on. The Action of Light on Dyes Applied to Cotton Fabrics, P. W. Cunliffe. Textile Inst.—Jl., vol. 15, no. 4, Apr. 1924, pp. T173-T194. Summary of literature on fading. Bibliography.

Adsorption by Mordants. Effect of Hydrogen-Ion Concentration on Compound Formation and Adsorption of Dyes by Mordants, R. E. Marker and N. E. Gordon. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1186-1188, 5 figs. Investigation to show quantitative effect of hydrogen-ion concentration on adsorption of acid and basic dyes by mordants.

Retention by Silicic Acid. Retention of Organic Dyestuffs by Silicic Acid (Ueber das Verhalten von organischen Farbstoffen zu Kieselsäure), E. Berl and W. Pfannmüller. Kolloid-Zeit., vol. 35, no. 3, Sept. 1924, pp. 166-169. Finely divided quartz absorbs basic dyestuffs; reaction is reversible and color can be removed by washing; with ignited quartz powder and with commercial specimens of precipitated silica, adsorption was irreversible.

DYNAMICS

Theory. Contribution to the Knowledge of the Theory of Motion (Beiträge zur Kenntnis der Bewegungslehre), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, nos. 41, 44, and 49, Oct. 28, Nov. 18, and Dec. 23, 1924, pp. 549-551, 589-592, and 662-664, 37 figs. Discusses motion of eccentric disks and cams and their calculation.

DYNAMITE. See EXPLOSIVES, Dynamite.

DYNAMOMETER CARS. See CARS, Dynamometer.

DYNAMOMETERS.

Belt. Some Power Studies Through Use of the Ohio Recording Belt Dynamometer, G. W. McCuen. Agricultural Eng., vol. 5, no. 3, Mar. 1924, pp. 51-55, 13 figs. Describes dynamometer that will record power requirements and performance of belt-driven machines; prime mover, in a cradle, swings to make possible recording of a torque due to resistance in a belt. Studies in threshing and baling straw. Tests on effect of sharpness of knives.

Direct-Reading Power Indicator. A Direct-Reading Power Indicator (Indicateur de puissance à lecture directe), H. Guillou. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 135, no. 10, Dec. 1923, pp. 1163-1170, 7 figs. Apparatus developed by author which, in contrast to simple dynamometer, registers actual power transmission at any moment; can be applied in all cases where power is transmitted by means of rotating shaft.

Hub. Dynamometer Hub for 200-M-Kg. Torsional Moment and 1200-Kg. Tension (Die Messnabe für 200 m-kg. Drehmoment und 1200 kg. Zug, Bauart Stieber), W. Stieber. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 7-8, Apr. 26, 1924, pp. 69-73, 18 figs. Describes development of dynamometer hub, of Stieber design, suitable for Liberty-12 engine; results of tests.

Railway. See CARS, Dynamometer.

Torsion. Experience With Vieweg Torsion Dynamometer (Erfahrungen mit Torsionsdynamometern nach Vieweg), H. Herttrich and E. Krabbe. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1028-1032, 7 figs. Describes mechanical and optical parts. Experience especially as to accuracy of measurement, calibrating, and interruptions. Field of application.

The Amsler Torsion Dynamometer with Stroboscopic Reading Device (Dynamomètre de torsion, système Amsler, avec dispositif de lecture stroboscopique). Génie Civil, vol. 84, no. 11, Mar. 15, 1924, pp. 260-261, 2 figs. Apparatus for measuring power absorbed by high-speed machines forced to overcome an almost constant resistance.

Torsion Dynamometer (Torsionsdynamometer), L. Klein. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 32, Aug. 9, 1924, pp. 830-831, 4 figs. Transmission dynamometer suitable for measuring power of textile or other industrial machinery under working conditions; in use, key of driving pulley on machine is removed and instrument is attached to driving shaft by coupling; ordinates of resulting diagram are turning moment and displacement, and its area records work done; results of tests and typical portion of record are given; instrument works satisfactorily at speeds up to 1200 r.p.m.

Types. Some New Dynamometers, J. S. G. Primrose. Mech. World, vol. 75, nos. 1936, 1937, and 1938, Feb. 8, 15, and 22, pp. 87-88, 100-102, and 115-116, 7 figs. Review of some of the more modern means of measuring force, contrasting them with some of the older forms which are better known.

DYNAMOS. See ELECTRIC GENERATORS, D. C.

E

EARS

Acoustics of. See ACOUSTICS, Ear.

EARTH

Diatomaceous. The Origin and Uses of Diatomaceous Earth, V. L. Eardley-Wilmot. Can. Min. Jl., vol. 45, no. 38, Sept. 19, 1924, pp. 918-920. Discusses composition, story of diatom, diatom theory for origin of oil, formation of diatomaceous earth, uses, etc.

Elements in. The Radial Distribution of Certain Elements in the Earth, H. S. Washington. Wash. Acad. Sci.—Jl., vol. 14, no. 19, Nov. 19, 1924, pp. 435-441. It appears that earth is mainly composed, to extent of over 98 per cent, of only seven elements which, in their order of abundance, are: iron, oxygen, silicon, magnesium, nickel, calcium, and aluminum.

Heat of, Determination. The Heat of the Earth, O. Wilson. Sci. Am., vol. 130, no. 2, Feb. 1924, pp. 98 and 143-144, 5 figs. Apparatus with which deep temperatures are determined.

Interior of. Seismophysics and the Interior of the Earth (Sur les bases nouvelles de la sismophysique et sur la constitution interne du globe terrestre), R. Yamamoto. Annales de Physique, vol. 1, May-June 1924, pp. 293-345, 5 figs. Comprehensive exposition, mostly mathematical, of theory applying to propagation of seismic waves; gives general theory of waves as well as methods used for calculating positions of epicenter and hypocenter and velocity of waves; theory of Wiechert that center of earth is of metallic iron appears to lack confirmation, as variation of velocity with depth appears to be continuous.

Magnetic Field. A Method for Determining the Total Intensity of the Earth's Magnetic Field from a Moving Support. Terrestrial Magnetism & Atmospheric Electricity, vol. 29, no. 1, Mar. 1924, pp. 41-46, 2 figs. Describes method which is an attempt to eliminate "settings" and "readings" which involve calculations when using such instrument at sea.

Pressure. Determination of Sliding Surfaces in Taking Earth Pressures (Bestimmung der Gleitflächen bei Erddruckermittlungen), M. Buchwald. Bautechnik, vol.. 2, no. 48, Nov. 7, 1924, pp. 546-549, 20 figs. Describes a simplified method of calculation and gives examples of applications.

Investigation of the Coulomb Earth-Pressure Theory (Untersuchung der Erddrucktheorie von Coulomb), A. Freund. Bautechnik, vol. 2, no. 12, Mar. 18, 1924, pp. 101-109, 30 figs. Origin, nature, and evaluation of the Coulomb principle; rectification and development of theory with aid of laws of elasticity.

See also FOUNDATIONS, Bearing Soils.

Temperatures Within, Calculation of. Temperature at Moderate Depths Within the Earth, L. H. Adams. Wash. Acad. Sci.—Jl., vol. 14, no. 20, Dec. 4, 1924, pp. 459-472, 2 figs. Factors which determine cooling of primitive Earth; initial temperatures near surface; calculates probable temperatures in upper 300 kilometers.

EARTHQUAKES

Causes. Inside the Earth, and Out, Oliver Lodge. Sci. Am., vol. 130, no. 6, June 1924, pp. 374-375, 3 figs. Conditions in rock crust that lead to earthquakes.

Characteristics of. Earthquakes and Their Characteristics (Los terremotos y sus caracteristicas), R. E. J. Summers. Ingeniería Internacional, vol. 11, no. 5, May 1924, pp. 231-233, 3 figs. Deals with resistance of buildings to seismic shocks and gives formulas for use in designing earthquake-proof structures.

Damage to Electrical Installations. A Brief Description of the Damage Done to Electrical Installations by the Earthquake and Emergency Measures, M. Shibusawa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 425, Dec. 1923, pp. 925-941, 17 figs. on supp. plates. Describes damage done to electrical installations of Japan by earthquake and measures taken to restore stricken district from these chaotic conditions. (In Japanese.)

Japan. On the Recent Earthquake, A. Imamura. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 426, Jan. 1924, pp. 7-18. (In Japanese.)

Six Lessons from the Japan Earthquake, R. F. Moss. Mich. Architect & Engr., vol. 6, no. 2, Feb. 1924, pp. 18-22, 1 fig. Gives six important lessons and recommendations for future construction.

See also TELEGRAPH LINES, Earthquake Damages, Japan.

Japan, Structures Subjected to. See BUILDING CONSTRUCTION, Earthquake Protection; Reinforced-Concrete.

Resistance of Buildings to. See BUILDINGS, Japan, Resistance to Earthquake.

ECCENTRICS

Turning. See MACHINING METHODS, Eccentrics, Turning of.

ECONOMIZERS

Cast-Iron. Cast-Iron Flue-Gas Economizer for Low and High Pressures (Gusseiserne Rauchgas-Vorwärmer für niedrigen und hohen Druck). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 23, June 7, 1924, pp. 609-610, 9 figs. Repeated pressure tests followed by cold-water pressure on two test pieces of pearlitic iron casting show that internal pressure can be increased up to 140 atmos.

Construction and Operation. Economizers and Their Place in Boiler Work. Boiler Maker, vol. 23, no. 12, Dec. 1924, pp. 351-353, 8 figs. How economizers are built; theory of operation; methods used in their repair.

Efficiency. Examination and Opinion on Economizers (Beitrag zur Untersuchung und Begutachtung von Rauchgasheizkörpern), G. Polcich. Feuerungstechnik, vol. 13, no. 5, Dec. 1, 1924, pp. 45-47. Report of experiment station of Technical Institute in Vienna on efficiency of economizers applied to house heating, showing that no advantage is derived from their application if stoves are properly constructed.

High-Pressure. Advances in Economiser Practice. Power Engr., vol. 19, no. 215, Feb. 1924, pp. 63-64, 3 figs. Describes Ringstay economizer for high-pressure work.

Operation and Types. The Efficient Operation of the Economiser. Eng. & Boiler House Rev., vol. 37, no. 11, June 1924, pp. 425-427, 3 figs. Methods whereby maximum efficiency may be obtained, both as regards reduction in coal bill and satisfactory operation of installation, especially from point of view of length of service.

See also BOILERS, Operation and Types.

EDUCATION, ENGINEERING

Calculus, Value in. Value of Calculus to the Engineer, R. Fleming. Can. Engr., vol. 46, no. 23,

June 3, 1924, pp. 587-588. Divergent views as to value of calculus. Personality of instructor of more importance than text book; better to learn calculus at college than after.

Cambridge University. Engineering Education at Cambridge University. Engineer, vol. 138, no. 3591, Oct. 24, 1924, pp. 462-464, 10 figs. partly on supp. plate. Connected account of use and development of engineering teaching in University; describes accommodation and equipment of laboratories; results which have been striven for and, to large extent, gained.

College Personnel System. Personnel System for a College of Engineering, A. A. Potter. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 330-331. Details and experience of Purdue University with system developed with funds provided by manufacturers.

Coöperative. Co-operative Railway Engineering Courses. Ry. Age, vol. 77, no. 21, Nov. 22, 1924, pp. 921-924, 7 figs. Program worked out by Central of Ga. Ry. and Ga. School of Technology.

Courses. Engineering Courses for the Functional Rather Than the Industrial Divisions of Engineering, E. Bennett. Eng. Education, vol. 14, no. 10, June 1924, pp. 582-599. Functional divisions of engineering are considered to be functional divisions found within any of the large industrial organizations.

Electrical Engineering. Electrical Educational Institutions Get Closer to Industry. Elec. Wld., vol. 84, no. 7, Aug. 16, 1924, pp. 311-313, 4 figs. Discusses growth in number of students, trend of education in its relation to industry, poor salaries paid to teachers.

Germany. Exposition of German Committee for Technical Schools in Hannover (Die Ausstellung des Deutschen Ausschusses für Technisches Schulwesen in Hannover). Maschinenbau, vol. 3, nos. 25 and 27, Oct. 9 and Nov. 13, 1924, pp. 973-974 and 1070, 2 figs. Details of engineering exhibit, drawings and models for training of apprentices.

New Media for Instruction at Technical Schools (Neue Lehrmittel für technische Schulen), R. Harm. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 929-930, 2 figs. Details of colored instruction charts explaining processes and apparatus used in various branches of engineering by means of progressive illustrations; for use in schools and colleges.

Technical Traveling Exhibit of the V. D. I. (Die betriebstechnische Wanderausstellung des Vereines Deutscher Ingenieure), Ph. Wisotzky. Sparwirtschaft, vol. 1, no. 15-16, Aug. 1924, pp. 73-74. Particulars regarding traveling exhibit representing various engineering lines, including State Railways, prepared by V. D. I. and circulating among principal industrial towns in Germany and Austria.

Highway Engineers. See ENGINEERS, Highway, Training of.

Leaders and Routine Practitioners. Educating Leaders and Routine Practitioners, C. C. Williams. Eng. Education, vol. 14, no. 9, May 1924, pp. 528-535. Considers question of whether colleges can effectively train both leaders and routine practitioners simultaneously.

Metallurgy. On Metallurgical Education, S. L. Hoyt. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 195-202. Recommends emphasizing and giving fundamentals in training to students, and handling practical side largely outside of curriculum, illustrating his idea by brief course in metallography.

Symposium on Metallurgical Education Held at the Fifth Annual Convention of the Society, Pittsburgh, October, 1923. Am. Soc. Steel Treating, vol. 5, nos. 2 and 3, Feb. and Mar. 1924, pp. 169-182 and 302-316, 3 figs. Feb.: Contributions by C. Upthegrove and A. E. Crockett and discussion. Mar.: Contribution by F. Crabtree; discussion of metallurgical education, by O. E. Harder; and discussion.

Symposium on Metallurgical Education Held at Sixth Annual Convention of the Society at Boston. Am. Soc. Steel Treating—Trans., vol. 6, no. 6, Dec. 1924, pp. 692-715, 2 figs. Contains following papers: What Constitutes the Best Metallurgical Education, B. Stoughton; Metallurgical Education, D. J. Demorest; The Education of the Research Men, K. Honda; and discussion.

Mining. Mining Engineering Education Since 1910, G. M. Butler. Jl. Eng. Education, vol. 15, no. 4, Dec. 1924, pp. 261-270 and (discussion) 270-284. Discusses three outstanding things that have exerted pronounced influence upon mining engineering education since 1910: (1) the world war; (2) Mann report on study of engineering education; (3) conference on commercial training for engineers fostered by U. S. Bur. of Education, held in Washington in June, 1919.

Power-Plant Engineering. Training Engineers for Alberta's Power Plants, R. M. Dingwall. Power House, vol. 17, no. 14, July 20, 1924, pp. 19-20 and 40-41, 3 figs. Provincial Inst. of Technology & Art, Calgary, Alberta, gives complete course in mechanical engineering consisting of two terms of 8 mo. each; students devote 50 per cent of their time to practical work.

Professional Training and. College Education and Professional Training, W. E. Wickenden. Jl. Eng. Education, vol. 15, no. 3, Nov. 1924, pp. 180-183. Characteristics of collegiate education and professional training.

Professional Training beyond Undergraduate Course. The Four-Years Course and After, J. B. Whitehead. Jl. Eng. Education, vol. 15, no. 3, Nov. 1924, pp. 184-189. Points out that industry must do more to emphasize importance of continuance of formal professional training beyond undergraduate years, and that for correction of present unfortunate conditions, some kind of united action on part of industry is necessary, in offering encouragement to certain number of promising young men each year to go forward into advanced work.

Selective Sectioning in Thermodynamics. Selective Sectioning in Thermodynamics. A Progress Report on a Continuing Pedagogical Experiment, Geo. W. Munro. Jl. Eng. Education, vol. 15, no. 3, Nov. 1924, pp. 202-213. In June 1924, Purdue Univ. completed third semester of experiment in selective sectioning of students in thermodynamics; author, who is professor of thermodynamics at University, sets forth object sought, methods employed, difficulties encountered, and results secured.

Tabulated Recapitulations, Use of. Tabulated Recapitulations as a Means of Education, P. A. Cushman. Eng. Education, vol. 14, no. 8, Apr. 1924, pp. 450-458, 4 figs. Points out in what ways engineering students would gain by use of tabular recapitulations during their study of fundamental courses.

Teaching, Methods of. At What Are We Aiming and With What?, F. W. Springer. Eng. Education, vol. 14, no. 10, June 1924, pp. 565-581. Proposes a key or outline of educational theory and makes more apparent desirability and possibility of finding cues for application of theory to engineering education.

EDUCATION, INDUSTRIAL

[See also EMPLOYEES, TRAINING OF.]

Character and Extent. Education and Training for the Industries. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 482-483. Investigation into character and extent of such training. Making

industry attractive to high-school and college students. Labor as a means of social salvation.

Coal Mining. See COAL MINING, Educational Requirements.

Foundry School. French Establish Foundry School, V. Delport. Foundry, vol. 52, no. 7, Apr. 1, 1924, pp. 250-252, 4 figs. See also Iron Trade Rev., vol. 74, no. 15, Apr. 10, 1924, pp. 992-994, 3 figs. Comprehensive plan launched to provide thorough preparation for foundry engineers and managers; degree of engineer in foundry practice granted; school is linked with apprenticeship system; located in Paris.

Machinists. Can a School Turn Out First-class Machinists?, C. O. Herb. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 622-625, 4 figs. Methods followed in machine shop of Worcester Boys Trade School, Worcester, Mass., run on a commercial basis; describes shop work courses.

Training for Industries. Education and Training for the Industries. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 145-147. Report of conference on subject, held at A. S. M. E. annual meeting; includes address by R. L. Sackett on industrial education in Great Britain.

EDUCATION, VOCATIONAL. See VOCATIONAL TRAINING.

EGGS

Preservation. Industrial Preservation of Fresh Eggs "A La Coque" (For Boiling), F. Lescarde. Ice & Cold Storage, vol. 27, no. 312, Mar. 1924, pp. 53-56, 5 figs. Description of Lescardé process and results of experiments made with it; commercial advantages of the process.

EJECTORS

Steam-Jet Vacuum. The Steam Jet Vacuum Ejector. Mech. World, vol. 76, nos. 1973 and 1974, Oct. 24 and 31, 1924, pp. 264-265 and 277-278, 5 figs. Discusses principles underlying action of ejector and gives equations and methods whereby, with suitable coefficients, vacuum ejector may be designed.

ELASTICITY

Calculation. On the Application of Variational Equations to Statical Problems of Elasticity, A. Ono. Kyushu Imperial Univ. College of Eng.—Memoirs, vol. 3, no. 2, 1924, pp. 87-116, 7 figs. Considers the various conditions in which strain-variational and stress-variational equations are applied, and compares results of calculation with actual experiments.

Limit of. The Problem of Elasticity (Zur Frage der Elastizität), J. Czochralski. Zeit. für Metallkunde, vol. 16, no. 12, Dec. 1924, pp. 457-461. Limit of elasticity as basis for calculations of constructor.

Modulus of. The Variation of Young's Modulus at High Temperatures, C. H. Lees, J. P. Andrews and L. S. Shave. Physical Soc. Lond.—Proc., vol. 36, Pt. 5, Aug. 15, 1924, pp. 405-416, 3 figs. Shows by experiments that for fused quartz modulus changes only slightly between 0 deg. and 800 deg. cent.; for platinum, nickel, and aluminum wire decreases with rise of temperature, at low temperatures slowly, at high, more rapidly.

Photo. See PHOTOELASTICITY.

Plasticity and. Plasticity and Elasticity, E. C. Bingham. Franklin Inst.—Jl., vol. 197, no. 1, Jan. 1924, pp. 99-115, 9 figs. Notes on varieties of flow; stress-time curves; stress-strain diagram; rigidity; resilience and restitution; elastic after-effect.

ELECTRIC ARC

Carbon Arcs. Researches on the Carbon Arc; Vapor Pressure Determinations of the Carbon (Untersuchungen am Kohlelichtbogen; Dampfdruckbestimmungen des Kohlenstoffs), H. Kohn and M. Guckel. Zeit. für Physik, vol. 27, no. 5-6, 1924, pp. 305-357, 10 figs. Discusses measurement of intrinsic brilliancy of positive crater, and of temperatures, for determining vapor pressure curve of carbon, from which heat of vaporization of carbon is calculated.

The Relation Between Current, Voltage, and the Length of Carbon Arcs, A. E. R. Westman and R. B. Walker. Am. Electrochem. Soc.—Advance paper no. 24, for meeting Oct. 2-4, 1924, pp. 345-359, 8 figs. Results of investigation of relation between current, voltage and arc length for carbon arcs carrying alternating currents of from 100 to 700 amp. Gives also current and voltage wave forms and discusses their significance.

Characteristics. Minimal Length Arc Characteristics, H. E. Ives. Franklin Inst.—Jl., vol. 198, no. 4, Oct. 1924, pp. 437-473, 28 figs. Investigation to see whether experimental test reveals phenomena in accord with conception of minimal or zero length arc; consequences to be investigated are specifically those to be drawn as to nature of discharge at separating contacts, or break arcs; evidence is presented that discharge occurring between separating electrodes is, for large currents, an arc; for small currents, an atmospheric spark; method of isolating arc discharge for study.

Cold. Existence of a Light Arc With Cathode Not Glowing (Ueber die Existenz des Lichtbogens bei nicht glühender Kathode), H. Stolt. Zeit. für Physik, vol. 26, no. 2, Aug. 8, 1924, pp. 95-101. Shows that between fixed anode and brass or copper cathode strongly cooled by rotation an arc can be produced, and that probably arc is possible without cathode at white heat.

High-Intensity. Studies in the Projection of Light. The High-Intensity Arc and the Parabolic Mirror, F. Benford. Gen. Elec. Rev., vol. 27, nos. 3, and 4, Mar. and Apr. 1924, pp. 199-207 and 252-260, 34 figs. Describes 150-amp. arc; its essential feature is a deep and well-formed crater that is constantly filled with a highly luminous gas whose temperature is about 5500 deg. A. Computations and curves on high-intensity arc, in which specific case of a 60-in. high-intensity searchlight is largely used.

Positive Crater, Temperature of. Temperature of the Positive Crater of an Electric Arc (Sulla temperatura del cratere positivo dell'arco elettrico), M. Pierucci. Nuovo Cimento, vol. 1, no. 3, July-Sept. 1924, pp. 227-241. Developments as to forced arcs; results of experiments on temperature of positive d.c. craters show that, generally speaking, temperature at crater is not constant; temperatures of forced arcs rise very high.

Resistance Distribution in. Sound Measurements in Arc Lights with High-Frequency Currents (Sondenmessungen am Lichtbogen mit Hochfrequenzströmen), A. Hagenbach and M. Werli. Zeit. für Physik, vol. 26, no. 1, Aug. 5, 1924, pp. 23-39, 4 figs. In previous work authors described method of determining high-frequency a.c. resistance in arc light; by this means it is possible to calculate its counter-electromotive force; in present paper distribution of resistance in arc is investigated, and counter-electromotive force at anode and at cathode is determined; gives diagram of experimental arrangements, and tabulated results obtained with different kinds of carbon electrodes.

Spectra. The Appearance of "Raies Ultimes" in the Spectra of Electric Arcs (Sur l'apparition des raies ultimes dans les spectres de l'arc électrique), St. Procopiu. Académie des Sciences—Comptes Rendus, vol. 178, no. 16, Apr. 14, 1924, pp. 1368-1369. Experiments made with arcs of Zn contain-

ing impurities such as Pb, Cd, Al, show that sensitive spectral lines of impurities appear strongly when arcs are operated in air but are faint or absent with arcs in vacuo; it is assumed that ionization is mainly of electrical origin in vacuum arc, but thermal with arcs at atmospheric pressure, and that emission of "raies ultimes" is therefore to be attributed to thermal mechanism.

ELECTRIC CABLES. See CABLES, ELECTRIC.

ELECTRIC CAPACITY

Measurement. See ELECTRICAL MEASUREMENTS, Capacity.

ELECTRIC CIRCUITS

Circuit Breakers. See CIRCUIT BREAKERS.

ELECTRIC CIRCUITS, A.C.

Calculation. New Theory of General Circuits (Neue Theorie des allgemeinen Stromkreises), S. Fryze. Elektrotechnische Zeit., vol. 45, no. 26, June 26, 1924, pp. 677-681, 5 figs. Discusses principal equations, their coefficients, critical impedance, and gives examples of new method.

Condenser, in. Condenser in the Alternating-Current Circuit with Valve (Kondensator im Wechselstromkreis mit Ventil), W. Jaeger and H. von Steinwehr. Archiv für Elektrotechnik, vol. 13, no. 4, July 31, 1924, pp. 330-348, 20 figs. Discusses connection to use both halves of alternating-current waves and investigates what capacity condenser must have to secure most favorable result and not to subject continuous current to too great variations.

Coupled, Transient Phenomena in. A Problem in Transient Phenomena in Coupled Circuits, E. E. Witmer. Franklin Inst.—Jl., vol. 198, no. 2, Aug. 1924, pp. 217-229, 2 figs. Methods of integration and evaluation of one-parameter integral; approximations and interpretation of results; time lags; effect of obliquity and eccentricity of trajectory on curve of electromotive force.

Coupling. Coupling Between Two Oscillatory Circuits, with Some Applications, L. S. Palmer and H. W. Forshaw. Instn. Elec. Engrs.—Jl., vol. 62, no. 334, Oct. 1924, pp. 895-900, 6 figs. Different methods of coupling two oscillatory circuits are classified as follows: (1) indirect coupling through field of force common to both oscillatory circuits, (2) direct coupling through impedance common to both circuits, (3) direct coupling through impedance not included in either oscillatory circuit; describes easy method of obtaining values of two resonant frequencies for each system.

Energy Measurement. See ELECTRICAL MEASUREMENTS, Energy in A. C. Circuits.

Four-Pole. Four-pole Theory (Vierpoltheorie), J. Wallot. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 488-492, 3 figs. Discusses behavior of connections consisting of a source of energy, a consumer, and connecting four-pole combinations.

Graphical Treatment. The Graphical Treatment of Circuits Containing Iron Core Reactances and Capacity, L. Fleischmann. Gen. Elec. Rev., vol. 27, no. 4, Apr. 1924, pp. 260-262, 11 figs. Graphic method for analytic treatment of circuits possessing variable self-induction and capacity.

Induction and Capacity. On the Caluculation of the Inductances and Capacities for a Multi-Range or Other Consecutive Series of Tuned Transmitting or Receiving Circuits, the Total Range and Accuracy Required Being Given, J. Erskine-Murray. Inst. Radio Engrs.—Proc., vol. 12, no. 4, Aug. 1924, pp. 485-496, 1 fig. Describes method of determining constants of each circuit when total wave length range and accuracy of setting required in each intermediate range are given.

Induotive. Inductive Alternating Current Circuits, E. K. McDowell. Power Plant Eng., vol. 28, no. 7, Apr. 1, 1924, pp. 387-388, 3 figs. Explanation of impedance diagram, together with rules for its construction.

Oscillating Valve. The Application of Oscillating Valve Circuits to the Precise Measurement of Certain Physical Quantities, J. E. P. Wagstaff. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 277, Jan. 1924, pp. 66-84, 8 figs. Describes application of oscillating valve circuits to several diverse problems.

Oscillatory. Experimental Investigations of Oscillatory Circuits with Iron Core Coils (Experimentelle Untersuchungen über Schwinungskreise mit Eisenkernspulen), L. Casper, K. Hubmann and J. Zenneck. Zeit. für Hochfrequenztechnik, vol. 23, no. 4-5, 1924, pp. 63-77, 31 figs. Discusses conditions in pure alternating current magnetization and in superimposed direct current magnetization, in condenser circuit to which alternating current generator of 500 periods per sec. was connected and whose self-induction was formed by coil with closed iron core.

Protection, Apparatus for. The Design of Apparatus for the Protection of Alternating-Current Circuits, A. S. Fitzgerald. Instn. Elec. Engrs.—Jl., vol. 62, no. 331, July 1924, pp. 561-598 and (discussion) 599-627, 58 figs. Description of differential protective systems, particularly those suitable for use where there is a neutral earthing resistance. Discusses operating conditions, and their influence on methods of design and construction, and describes improved means of practically applying the various protective circuits.

Reciprocities in. Reciprocities in A. C. Circuits (Ueber Reziprozitäten bei Wechselstromkreisen), K. Matthies and F. Strecker. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 1-15, 15 figs. Discusses resistance reciprocities and frequency reciprocities, combination of which leads to uniform treatment of four a. c. circuits forming a cyclic group.

Resonant. Electrical Resonance, E. Ambrose and P. B. Frost. Elecn., vol. 93, no. 2425, Nov. 7, 1924, pp. 524-525, 1 fig. Results of an investigation which throw some light on breakdowns and a. c. systems attributed to surges.

Study of Resonant Circuits, L. Fleischmann. Elec. World, vol. 83, no. 9, Mar. 1, 1924, pp. 430-431, 1 fig. Analytical treatment of a. c. circuit containing iron-ore reactance and condenser in parallel.

Theory. A Generalization of Reciprocal Theorem, J. R. Carson. Bell System Technical Jl., vol. 3, no. 3, July 1924, pp. 393-399. Generalization of Raleigh's theorem as to periodic electromotive force in circuit A giving rise to same current in B as would be excited in A if electromotive force operated in B.

Three-Phase. Modern Mathematics of the Three-Phase Circuit (La moderna matematica dei circuiti trifasi), E. Bottani. Elettrotecnica, vol. 11, nos. 30, 31, and 33, Oct. 25, Nov. 5 and 15, 1924, pp. 738-745, 768-774, and 928-937, 40 figs. Discusses three vector systems and makes calculations of a three-phase system of vectors.

Time Constants. Time Constants for Engineering Purposes in Simple Exponential Transient Phenomena, A. E. Kennelly. Nat. Acad. Sci.—Proc., vol. 10, no. 11, Nov. 1924, pp. 467-473, 4 figs. Definition of a simple exponential transient; typical case of a simple electric circuit; discusses exponential time constant, binary time constant, and decimal time constant; exponential transient current-time curves; rectification of exponential transients on arith-log paper.

Two-Mesh. Theorems Regarding the Driving-Point Impedance of Two-Mesh Circuits, R. M.

Foster. Bell System Technical Jl., vol. 3, no. 4, Oct. 1924, pp. 651-685, 7 figs. Determination of necessary and sufficient conditions that a driving-point impedance be realizable by means of a two-mesh circuit consisting of resistances, capacities, and inductances, and determination of networks realizing any specified driving-point impedance satisfying these conditions.

ELECTRIC CIRCUITS, D. C.

Graphic Calculation. Graphic Calculation of D. C. Electric Circuits (Graphique pour les calculs electriques en courant continu), J. Mesnier. Revue Générale de l'Electricité, vol. 15, no. 7, Feb. 16, 1924, pp. 263-266, 7 figs. Presents chart developed by author for rapid determination of characteristics, intensity, tension, resistance (or power) of d.c. circuit when the two other circuits are known; its principal application is to determine starting resistance, but other applications are exemplified.

ELECTRIC CONDUCTIVITY

Flames. Electric Conductivity of Flames Carrying Metal Vapors (Untersuchungen über die elektrische Leitfähigkeit metalldampfhaltiger Flammen mit Einführung einwandfreier Feldmessungen), E. Zachmann. Annalen der Physik, vol. 74, no. 14, July 1924, pp. 461-517, 16 figs. Finds that number of electrons is directly proportional to number of metal atoms, etc.; conductivity of alkali metal flames is proportional to square root of metal concentration, etc.

Fused Chlorides. The Electrolytic Conductivity of Fused Chlorides (Ueber das elektrolytische Leitvermögen geschmolzener Chloride), A. Voigt and Wm. Blitz. Zeit. für anorganische u. allgemeine Chemie, vol. 133, no. 4, Mar. 10, 1924, pp. 277-305, 6 figs. Describes behavior of chlorides of various minerals based on experimental results.

Metals. Electric Conductivity in Metal Aggregates (Die Elektrizitätsleitung in metallischen Aggregaten), M. Pirani and J. Runge. Zeit. für Metallkunde, vol. 16, no. 5, May 1924, pp. 183-185, 3 figs. Conductivity of binary aggregate can be calculated if one constituent is lodged in the other in regularly arranged cylinders or spheres, etc.

Electric Conductivity of Metals (Die elektrische Leitfähigkeit von Metallen). Elektrotechnik u. Maschinenbau, vol. 42, no. 26, June 29, 1924, pp. 413-415. Abstract from A. Schulze's articles dealing with copper, stone, gold; platinum group; nickel, cobalt, aluminum, lead, tin, bismuth, tungsten.

Electric Conductivity of Metals (Die elektrische Leitfähigkeit von Metallen), A. Schulze. Zeit. für Metallkunde, vol. 16, no. 2, Feb. 1924, pp. 48-54, 2 figs. Deals with changes in conductivity with modification conversions, and with melting of metals; dependence of conductivity on pressure; conductivity in magnetic field; conductivity with direct and with alternating current; change in conductivity through exposure and radiation; conductivity of powders and thin layers.

The Electrical Conductivity and certain other Properties of Metals and Alloys on the Basis of Bohr's Theory, K. Höjendahl. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 284, Aug. 1924, pp. 349-360, 1 fig. An attempt to account for properties of metals and alloys on basis of rotation of elliptic orbit of valency electron.

See also METALS, Electric Conductivity.

Temperature Coefficients. The Temperature Coefficients of Electric Conductivity (Notiz über den Temperaturkoeffizienten des elektrischen Leitvermögens), W. Blitz. Zeit. für anorganische u. allgemeine Chemie, vol. 133, no. 4, Mar. 10, 1924, pp. 306-311, 1 fig. Investigation of effect of temperature variations on transport of electricity.

ELECTRIC CONDUCTORS

Aluminum. Computing the Carrying Capacity of Aluminum Conductors, D. P. Slack. Power, vol. 60, no. 18, Oct. 28, 1924, p. 689. Method of calculation.

Use of Aluminum for High-Tension Overhead Lines (Die Verwendung des Aluminiums für Hochspannungsfreileitungen), M. Neustätter. Elektrotechnische Zeit., special no., Aug. 28, 1924, pp. 6-8, 2 figs. Discusses conductivity and other properties compared with copper, advantages and drawbacks for high tension transmission, steel-aluminum conductors, etc.

See also Heating of; Steel-Aluminum; ALUMINUM, Uses.

Armature. See ARMATURES, Eddy-Current Losses in.

Capacitance, Calculation of. The Direct Method of Calculation of Capacitance of Conductors, H. B. Dwight. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1034-1039, 4 figs. Describes direct method of calculation for multi-conductor cables with round conductors, which uses exact shape of round conductors and which gives accurate expressions for irregular distribution of electricity on conductors, and for value of capacitance.

Connections. The Resistance of Electrical Connections, G. E. Luke. Elec. Jl., vol. 21, no. 2, Feb. 1924, pp. 66-69, 7 figs. Discusses clamped, and soldered or welded connections; soldered sleeve connectors.

Crossing Railways. Electric Conductors Crossing the State Railways (Attraversamenti delle Ferrovie dello Stato con condutture elettriche). Telegrafi e Telefoni, vol. 5, no. 3, May-June 1924, pp. 145-150. Additional Italian regulations for construction and insulation of lines, crossing railroads overhead, above or below ground.

Current-Carrying Capacity. The Current-Carrying Capacity of Solid Bare Copper and Aluminium Conductors, S. W. Melsom and H. C. Booth. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 909-915, 7 figs. Describes cooling-curve method which was used in determining coefficient of heat emissivity for series of small sample lengths of round and flat copper and aluminum conductors of various sizes and surface conditions; this was checked by direct electrical heating of longer lengths, which showed two methods to be in close agreement; gives tables for current carrying capacity of copper and aluminum busbars.

Equilibrium and Deformation. Equilibrium and Deformation of Conductor Systems Traversed by Magnetic Currents and Bodies without Hysteresis (Equilibre et déformation de systèmes de conducteurs traversés par des courants et de corps magnétiques sans hystérésis), A. Liénard. Annales de Physique, vol. 20, Nov.-Dec. 1923, pp. 249-350. Study based on two notes published in Comptes Rendus de l'Académie des Sciences (vol. 172, 1921, pp. 207 and 323) on electromagnetic energy and thermocynamical potential of system of currents in presence of magnetic substances without hysteresis; method employed permits calculation of all possible cases and complete solution of problem of magnetostriction.

Free Electron Concentration Within. The Variation of Thermionic Emission With Temperature and the Concentration of Free Electrons Within Conductors, A. T. Waterman. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 366-376. Discusses equilibrium electron theory of thermionic emission.

Derivation of expression for thermionic saturation current density; evaluation of constants and application to experimental data; comparison with other formulas; discussion of lack of agreement for most oxides; calculation of free electron concentrations within conductors.

Hall Effect. Hall Effect in a Conductor Due to Its Own Magnetic Field, W. and B. Roberts. Physical Rev., vol. 24, no. 5, Nov. 1924, pp. 532-543, 13 figs. From results of investigation it is concluded that Hall effect is always present in wires carrying currents and should cause a slight increase of resistance at high current densities.

Heating of. Heating of Large Steel-Cored Aluminum Conductors, R. J. C. Wood. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1021-1024, 10 figs. Tests made to determine temperature rise, both in still air and in wind, of three sizes of cable.

Inductance, Redúcing. Reducing Inductance on Adjacent Transmission Circuits, H. B. Dwight. Elec. World, vol. 83, no. 2, Jan. 12, 1924, pp. 89-90, 2 figs. Explanation of arrangement of conductors on steel towers by which inductance is materially decreased.

Installation of Identified. Installation of Identified Conductors, C. W. Mitchell. Jl. of Elec., vol. 52, no. 1, Jan. 1, 1924, pp. 15-16, 17 figs. Answers many questions asked by contractor-dealers and construction men relative to certain provisions of new edition of Nat. Elec. Code.

Iron. Alternating Current in Iron Conductors (Wechselströme in massiven Eisenleitern). K. Zickler. Elektrotechnische Zeit., vol. 45, no. 25, June 19, 1924, pp. 650-651, 1 fig. Shows that Rosenberg formula for watt loss is less accurate than those by author.

Properties and Uses of Magnetic Conductors, with Special Reference to the Use of Iron (Propriétés et usages des conducteurs magnétiques et particulièrement emploi du fer), P. Bunet. Industrie Electrique, vol. 33, nos. 757, 758, 759, 760, 761, 762, and 763, Jan. 10, 25, Feb. 10, 25, Mar. 10, 25, and Apr. 10, 1924, pp. 5-8, 28-32, 48-54, 72-78, 91-96, 112-118, and 125-127, 15 figs. Discusses use of iron for conductors and some practical developments. Jan. 25: Causes of increase of resistance in variable current; Kelvin effect; permeability of iron; practical calculations. Feb. 10: Modification of resistance of iron conductors by variation of their surface or their permeability; derivation of formulas. Feb. 25: Effective section of plates for alternating flux. Mar. 10: Practical conclusion for round wire. Mar. 25: Resistance of magnetic conductors of variable direct current. Apr. 10: Non-magnetic conductors covered with magnetic envelope.

Joints. The Contact Resistance of Large Conductors, A. R. Enger. Elec Jl., vol. 21, no. 7, July 1924, pp. 316-318, 6 figs. Shows from experiments that voltage across contact will vary inversely with pressure, and that resistance between contacts depends only on total pressure with which they are forced together.

Kelvin's Law. Kelvin and the Economics of the Generation and Distribution of Electrical Energy, G. Semenza. Instn. Elec. Engrs.—Jl., vol. 62, no. 334, Oct. 1924, pp. 882-894, 7 figs. Author seeks to give clear picture of applications which Kelvin's law has received in all fields of electrotechnics and to demonstrate utility of various developments of law.

Modulus of Elasticity. The Modulus of Elasticity of Conductors With Particular Reference to Power Transmission Lines (Elasticitetsmodulen för linor med speciell hänsyn till kraftledningslinor), S. Velander. Teknisk Tidskrift, vol. 54, no. 9, Mar. 1, 1924, pp. 43-46 (Elektroteknik), 2 figs. Importance of separating permanent and elastic elongation of wires is emphasized. Diagrams giving results of tests.

Networks. Some Properties of Simple Electric Conducting Networks, A. E. Kennelly. Am. Philosophical Soc.—Proc., vol. 63, no. 2, 1924, pp. 171-189, 15 figs. Mathematical discussion of T and Pi line circuits, variation of hyperbolic angle, surge impedance, inequality ratio, etc. Bibliography.

Networks, Three-Terminal. Some Properties of Three-Terminal Electrical Conducting Networks, A. E. Kennelly. Am. Acad. Arts & Sci.—Proc., vol. 59, no. 13, July 1924, pp. 297-311, 17 figs. Mathematical discussion of T, Pi, and Delta line circuits; surge impedance; inequality ratio; etc. Bibliography.

Pull Exerted by. Chart for Determining the Effort Produced by Electric Conductors on Their Supports (Abaque pour la determination des efforts produits par les conducteurs electriques sur leurs supports), P. Burdin. Revue Générale de l'Electricité, vol. 16, no. 11, Sept. 13, 1924, pp. 425-428, 5 figs. Discusses graphic process for determining by same alignment chart mechanical effort produced by conductors, being component of wind pressure on conductors and their drag.

Self-Induction and Resistance Measurement. An A. C. Bridge for Measuring Self-Induction and Resistances in Short Conductors (Eine Wechselstrombrücke zur Messung der Selbstinduktion und des Wirkwiderstandes an kurzen Leitungsstücken), U. Meyer. Elektrische Nachrichten-Technik, vol. 1, no. 1, July 1924, pp. 29-36, 3 figs. Details of experiments made at German Telegraph Technical Bureau with Krarup wires in which this kind of bridge was largely used.

Steel-Aluminum. Calculation of Steel-Aluminum Conductors (Ueber die Berechnung von Stahlaluminiumleitungen), O. Strand. Elektrotechnische Zeit., vol. 45, no. 25, June 19, 1924, pp. 654-657, 6 figs. Develops formulas and diagrams for determining distribution of tension in Fe-Al cables at varying temperatures.

Tension Computation, Graph for. Straight-Line Graph for Computing Tensions in Line Conductors, E. S. Thayer. Elec. World, vol. 83, no. 3, Jan. 19, 1924, pp. 135-136, 2 figs. Rearrangement of older formula to obtain a straight-line diagram which will readily give proper tension to use, considering temperature and loading.

Theory. Electric Conductors and Insulators (Conduttori e isolanti in elettricita), G. Peri. Industria, vol. 38, no. 12, June 30, 1924, pp. 327-331, 8 figs. Discusses passage of current in conductors, formation of electrostatic field, capacity current, insulators, etc.

Wave Propagation Along. The Guided and Radiated Energy in Wire Transmission, J. R. Carson. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 908-913. Brief preliminary account, without mathematical details, of results of mathematical investigation of wave propagation along wires.

ELECTRIC COOKING

Equipment. An Electric Cooker—Some Experience, Figures and Facts, E. G. Ross. Elec. Rev., vol. 95, no. 2432, July 4, 1924, pp. 5-7. Superiority of electric over gas cooking, consumption of electric current.

Heavy-Duty. Development of Heavy Duty Electric Cooking, A. M. Lloyd. Elec. Light & Power, vol. 2, no. 2, Feb. 1924, pp. 20-23, and 50, 7 figs. Gives experiences relative to development of heavy-duty cooking load.

ELECTRIC CURRENTS

Acceleration. Method for Accelerating Rise of Current on Connecting Inductive Resistances to

a Source of Current of Contact Voltage (Ueber eine Methode zur Beschleunigung des Stromansteigens beim Einschalten induktiver Widerstände an eine Stromquelle konstanter Spannung), C. Schenfer. Elektrotechnik u. Maschinenbau, vol. 42, no. 32, Aug. 10, 1924, pp. 489-492, 7 figs.

Accidents from. See ACCIDENTS, Electric Currents.

Alternating. See ELECTRIC CURRENTS, ALTERNATING.

Boosting Voltage. Electric Boosting Voltage (Die Elektrische Ueberspannung), A. Smits. Zeit. für Elektrochemie, vol. 30, no. 5, May 1924, pp. 215-223, 3 figs. Discusses theory of electromotive equilibria to explain anode and cathode polarization, boosting voltage and passivity.

Dangers of. The Dangers of Electric Current and Means of Overcoming Them (Les dangers du courant électrique et les moyens de les éviter), V. Kammerer. Société Industrielle de Mulhouse —Bul., vol. 90, no. 2, Feb. 1924, pp. 103-156, 4 figs. Author seeks to show that electric current presents many dangers which are not always estimated at their true value; and deals in detail with precautionary measures to be taken in selection of materials, their judicious application, and control of installations, particularly in regard to insulation and grounding.

Effect on Friction of Sliding Contacts. See FRICTION, Sliding Contacts.

Measurement. See ELECTRIC MEASURING INSTRUMENTS; ELECTRICAL MEASUREMENTS, Alternating Currents.

Physiological Effects. Physiological Effects of Electric Current (Effets physiologiques du courant électrique). Electricien, vol. 55, no. 1359, Nov. 1, 1924, pp. 488-489. Deductions drawn from experiments on animals as to its effect on human beings. Resuscitation of victims.

Short-Circuits. Short-Circuits Calculations, R. Rader. Elec. Wld., vol. 84, no. 6, Aug. 9, 1924, pp. 261-262, 12 figs. Simple method for determining currents where calculation board is not available; practical application of formulas.

Short-Circuit Current in Case of Double Ground (Kurzschlussstrom bei Doppelerdschluss), T. Panzerbieter. Elektrotechnische Zeit., vol. 45, no. 27, July 3, 1924, pp. 719-720, 1 fig. Explains simple calculation of permanent short circuit current appearing in double grounds in rotary current systems and gives examples.

The Application of Decrement Factors in Short-Circuit Studies, W. R. Woodward. Elec. Jl., vol. 21, no. 5, May 1924, pp. 213-216, 4 figs. Consideration of nature of transients in short-circuit currents.

Theory. Electric Current Considered as Circulatin of Equal Charges and Opposite Signs (Le courant électrique considéré comme circulation de charges égales et de signes contraires), F. Guéry. Académie des Sciences—Comptes Rendus, vol. 179, no. 20, Nov. 17, 1924, pp. 1036-1039. Concludes that Weber's theory is only one at present in agreement with that of Maxwell and with hypothesis of charges in motion in conductors.

Wave, Measurement of. Wave Current Magnetization and Wave Current Measuring by Means of Measuring Instruments Containing Iron (Wellenstrommagnetisierung und Wellenstrommessungen mit eisenhaltigen Messgeräten), M. Stöckl. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 75-105, 28 figs. Discusses magnetization of d.c., a.c., and wave currents; wave current hysteresis loops; influence of unequal magnetic load of iron parts of measuring instruments on results of measurements.

ELECTRIC CURRENTS, ALTERNATING

Curves. Determination of Curve Contour of Alternating Currents with Aid of the Braun Tube (Zur Bestimmung der Kurvenform von Wechselströmen mit Hilfe der Braunschen Röhre), L. Casper, K. Hubmann and J. Zenneck. Zeit. für Hochfrequenztechnik, vol. 23, no. 2, Feb. 1924, pp. 32-34, 12 figs. Method used by authors in investigation of simple and coupled oscillating circuits with iron-core coils and also in frequency multiplication with aid of such coils.

Definition. Definition of Apparent and Reactive Factor as Well as Power Factor in Multiple-Phase Current (Die Definition der Schein- und Blindleistung sowie des Leistungsfaktors bei Mehrphasenstrom), H. Schering. Elektrotechnische Zeit., vol. 45, no. 27, July 3, 1924, pp. 710-712. Discusses definitions and terminology.

Distribution. Economic Distribution of Active and Reactive Currents Over Several Machines or Power Plants in Parallel (Die wirtschaftlichste Verteilung der Wirk- und Blindströme auf mehrere parallel arbeitende Maschinen oder Kraftwerke), C. v. Dobbeler. Elektrotechnische Zeit., vol. 45, no. 48, Nov. 27, 1924, pp. 1297-1301, 8 figs. Develops diagram for determining cost of production and transmission of any phase-displaced current, taking into account cost of current varying with extent of load on machines.

Frequency Analyzers. An Electrical Frequency Analyzer, R. L. Wegel and C. R. Moore. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 798-802, 9 figs. Theory and construction of apparatus by means of which it is possible to obtain a permanent record of frequency and magnitude of each component of a complex alternating current; its use in various fields.

Magnetizing Curves. Determination of Magnetizing Curves From the Effective Values of Magnetizing Alternating Current (Bestämning av magnetiseringskurvor ur magnetiseringsströmmens effectivvärde vid växelström), I. Herlitz. Teknisk Tidskrift, vol. 54, no. 36, Sept. 6, 1924, pp. 154-155 (Elektroteknik), 2 figs. Method given is purely theoretical, but is claimed to give fairly accurate results.

Measurement of. Nature and Measurement of the Alternating Currents Passing Through a Siemens Ozone Tube (Ueber die Natur und Messung der durch Siemenssche Ozonröhren fliessenden Wechselströme), E. Warburg. Zeit. für Technische Physik, vol. 4, no. 12, 1923, pp. 450-460, 4 figs. Various methods of measuring said current (of a frequency of 50 per second) give widely differing results. Instruments used and tabulated results obtained from a great number of tests with oxygen and air.

Parallel Connection. Behavior of A. C. Circuits for Parallel Connection of Iron Choking Coils and Condensers (Das Verhalten von Wechselstromkreisen bei Parallelschaltung von Eisendrosselspule und Kondensator), L. Fleischmann. Elektrotechnische Zeit., vol. 45, no. 48, Nov. 27, 1924, p. 1307, 2 figs. Shows that in parallel connection of saturated iron choking coil and capacity effective total current can never be zero, but that a relative maximum and minimum of current appears, depending on voltage for constant period and vice versa.

Reactive. Compensation of Reactive Current (Ueber Blindstromkompensation), E. Schulz. Elektrotechnischer Anzeiger, vol. 41, nos. 137 and 138-139, Aug. 26 and 28, 1924, pp. 737-738 and 745-746, 2 figs. Discusses reactive current and compensator to increase power factor $\cos \phi$, and shows field of application of compensator.

Measuring Reactive Current and Its Consumption (Ueber Blindleistungs- und Blindverbrauchsmessungen), R. Scheld. Wissenschaftliche Ab-

handlungen der Physikalisch-Technischen Reichsanstalt, vol. 7, no. 2, 1924, pp. 215-224, 5 figs. Calculation of active and reactive current in a three-phase circuit with and without neutral, and method of measuring reactive current.

Varieties of Reactive Current Calculation and Their Justification (Arten der Blindstromberechnung und ihre Berechtigung), Mannel. Elektrische Betrieb, vol. 22, no. 18, Sept. 24, 1924, pp. 182-184. Discusses definitions and calculation, power factor variation, producers' demand for compensation when $\cos\phi$ falls below 0.07 or 0.8.

Rectification. See RECTIFIERS.

Theory. Elementary Theory of Alternating Currents, K. C. Graham. Ry. Elec. Engr., vol. 15, nos. 4, 5, 7, 8, 9, 11, and 12, Apr., May, July, Aug., Sept., Nov., and Dec. 1924, pp. 115-117, 151-153, 219-221, 261-264, 285-288, 395-398, and 421-423, 65 figs. Apr.: How alternating current is generated. May: Generation of single and polyphase currents. July and Aug.: Consideration of inductance and capacity. Sept.: Inductance and capacity of parallel circuits. Nov.: Generators. Dec.: Transformers.

Vector Diagrams and Algebraic Signs. Vector Diagrams and Algebraic Signs in Alternating-Current Theory (Ein Beitrag zur Richtungsbezeichnung in Vektordiagrammen), H. Kalka. Elektrotechnik u. Maschinenbau, vol. 42, no. 21, May 25, 1924, pp. 329-333, 7 figs. Considers general case of network to which are connected generators and consuming devices; after considering expressions for power and wattless components of currents and power and wattless components of volt-amperes, he advances reasons for adoption of rules which are least likely to occasion confusion.

ELECTRIC DISCHARGE

Force on Cathode in Tube. Mechanical Force and Field Strength at the Cathode in a Discharge Tube (Kraft und Feld an der Kathode einer elektrischen Glimmentladung), W. Braunbek. Zeit. für Physik, vol. 21, no. 3, Feb. 8, 1924, pp. 204-218, 11 figs. It is shown that force exerted on cathode in electrical discharge tube is due to electric force, depending on field intensity at cathode, and an aerodynamic force which is due to pressure differences set up in gas and gas currents arising therefrom; describes method which aims at elimination of force due to gas currents and measures only electric force.

High-Frequency. Electric Discharge of Very High Frequency (Sur la décharge électrique à fréquence très élevée), C. Gutton. Académie des Sciences—Comptes Rendus, vol. 178, no. 5, Jan. 28, 1924, pp. 467-470. High-frequency discharge in glass tubes containing dry air at low pressure; curves were obtained representing as function of pressure, difference of potential for which tubes become luminous.

Mercury Vapor. The Thermal Effect of Cathodic Plate Current in the Mercury-Vapor Discharge (Ueber die Wärmewirkung kathodischer Gehäuseströme in Quecksilberentladungen), W. Schottky and J. von Issendorff. Zeit. für Physik, vol. 26, no. 2, Aug. 8, 1924, pp. 85-94, 4 figs. Examination of current which passes between mercury discharge column and surrounding cylindrical metal electrode maintained at definite potentials; to ascertain nature of discharge, determination is made of heat imparted to surrounding electrode by discharge when different potentials are applied.

ELECTRIC DISTRIBUTION

Circular Circuit. Current Distribution in Circular Circuit Fed Through Radii (Stromverteilung in einem Rade), J. Würschmidt and F. Stäblein. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 15-22, 3 figs. Given a wheel with a number of spokes, an electric current passing through it and leaving it at the periphery, calculates resistance of wheel, and strength of current in individual spokes.

Economics. Economics of Distribution, J. G. H. Douglas. Elec. Wld., vol. 84, no. 22, Nov. 29, 1924, pp. 1145-1148, 6 figs. Extension of Kelvin's law to secondary mains, underground cables and transformers; specific applications of principles to circuits; economic versus temperature ratings.

ELECTRIC DISTRIBUTION SYSTEMS

Alternating-Current. General Properties of Transmission Systems Traversed by Alternating Current in Constant Operation (Sur quelques propriétés générales des réseaux parcourus par des courants alternatifs en régime permanent), C. Ravut. Revue Générale de l'Electricité, vol. 15, no. 10, Mar. 8, 1924, pp. 405-413, 1 fig. Author shows how to determine experimentally different coefficients of characteristic function of intensities and points to existence of characteristic function of potentials which he calls adjunct characteristic function; examination of these two functions leads to determination of pulsations of resonance of network.

A. C. Underground. Alternating Current Underground Distribution in New Orleans, W. R. Bullard. La. Eng. Soc.—Proc., vol. 10, no. 4, Aug. 1924, pp. 179-199 and (discussion) 199-202, 10 figs. partly on supp. plates. Description of present and proposed systems; a.c. low-voltage distribution network; use of 13,200-volt distribution transformers; 3-phase, 4-wire, 115/200-volt distribution; advantages of new system.

Calculation. Calculating Distribution Lines, A. Burt. Elec. World, vol. 83, no. 5, Feb. 2, 1924, pp. 232-233. Rough-and-ready rule applied to ordinary distribution problems; illustrative examples for distribution circuits.

Charts for Calculation of Electric Distribution Systems (Abaquues pour le calcul des réseaux de distribution d'énergie électrique; Simplification par anamorphose entraînant l'universalité), E. Lajour and M. Pelou. Revue Générale de l'Electricité, vol. 16, no. 15, Oct. 11, 1924, pp. 579-586, 4 figs. Discusses a simplified method using logarithmic paper.

Canada. Electric Power Transmission and Distribution in Canada, J. C. Smith and C. V. Christie. Eng. Jl., vol. 7, no. 7, July 1924, pp. 421-446, 17 figs. Current practice in design and operation of electrical transmission and distribution systems in Canada.

Chicago, Ill. General Light and Power Supply of Chicago, G. M. Armburst and J. B. Jackson. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 608-609. Development of a distribution system is largely determined by load density and its rate of change. Discussion of these factors and their influence on Chicago distribution system.

Conduits. See CONDUITS, Electrical.

Control and Protection. Control and Protection of High-Voltage Electric Distribution Systems (Controle et manœuvres dans les réseaux électriques à haute tension), M. Hunter. Société Française des Electriciens—Bul., vol. 4, no. 31, Jan. 1924, pp. 67-92, 9 figs. Shows necessity of localizing faults in distribution system, in spite of complications involved; deals with origin of electric disturbances and principles applied for localizing them; special protection of bus-bars.

Control and Switching of High-Pressure. The Control and Switching of High Pressure Distribution Systems, P. V. Hunter. Elec. Rev., vol. 94, nos. 2407 and 2408, Jan. 11 and 18, 1924, pp.

72-74 and 113-114, 7 figs. Discusses methods and arrangements necessary to secure uninterrupted supply of electricity, so far as this can be done by selectively switching feeders and apparatus in and out of circuit. (Abstract.) Paper read before Société Française des Electriciens.

Cost Estimates. Appraisals Based on Number of Meters Connected, R. B. Sleight. Elec. World, vol. 83, no. 26, June 28, 1924, pp. 1322-1323. Analysis of cost estimates on small-town distribution systems; limitations and practical application of method.

D. C., Calculation. The Calculation of D. C. Systems by Successive Approximations (Le calcul des réseaux à courant continu par approximations successives), J. Kuntziger. Assn. des Ingenieurs Electriciens Sortis de l'Institut Electrotechnique Montefiore—Bul., vol. 2, series 7, Jan. 1924, pp. 15-23, 3 figs. Describes simple method of calculation which permits satisfactory solution of problem for all practical purposes.

Double-Voltage, for Rural Districts. Double-Voltage Distribution Systems (Les systèmes de distribution à deux tensions), L. Olivié. Revue Générale de l'Electricité, vol. 15, no. 13, Mar. 29, 1924, pp. 550-557. Their application to rural districts with scattered population; author points out advantages of system which he proposes, and points out that system based on same principle has already been successfully adopted in Canton of Fribourg, Switzerland, where rural population is greatly scattered.

Fault-Resistance Determination. The Measurement of the Fault Resistance of a 2-Wire Direct-Current System, G. W. Stubbings. Elec. Rev., vol. 95, no. 2452, Nov. 21, 1924, pp. 769-770, 2 figs. Describes test which is particularly applicable to 2-wire networks working with negative permanently earthed through low resistance.

France. Circular Defining the Technical Conditions Which Distribution of Electric Energy Must Satisfy (Circulaire déterminant les conditions techniques auxquelles doivent satisfaire les distributions d'énergie électrique). Revue Générale de l'Electricité, vol. 16, nos. 3 and 4, July 19, and 26, 1924, pp. 125-136 and 171-184, 2 figs. Issued by Minister of Public Works, Ports and Merchant Marine to police captains in France.

Grounding of Neutral. Inductive Grounding of the Neutral of Cable Networks (Die Erdung der Neutralen in Kabelnetzen), E. Neumann. Elektrotechnische Zeit., vol. 45, nos. 13 and 14, Mar. 27 and Apr. 3, 1924, pp. 261-266 and 294-297, 42 figs. In municipal underground cable of Berlin, Germany, operating with 30 kv., extensive practical tests were made before final inductive grounding protection was installed; results of preliminary investigations with direct and ohmic resistance grounding of neutral point; oscillographic tests preceding standardization of system; different behavior of grounding coils with varying degrees of undercompensation; mechanical method which permits unskilled operators to adjust inductance of grounding coils always in accordance with number of cable trunks connected to system.

Insulating and Grounding in. Insulating and Grounding in Electric Plants (Isolierung und Erdung in elektrischen Betrieben), W. Vogel. Wärme, vol. 47, no. 38, Sept. 19, 1924, pp. 439-442. Necessity for careful insulating and earthing to avoid dangers, proper methods and tests to apply.

Leakage-Protection Device. Couse-Rosebourne Leakage Protection. Power Engr., vol. 19, no. 225, Dec 1924, pp. 449-451, 5 figs. System of leakage protection for d.c. feeders.

Load Dispatching, Centralized. Load Dispatching System of P. G. & L. Co., C. W. Geiger. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 543-545, 3 figs. Control is centralized in one office; carrier-current system in continuous use.

Load Distribution in Generators. A New Apparatus for the Determination of Best Effective and Blind Load Distribution in Multiple-Feed High-Tension Systems (Ein neuer Apparat zur Ermittelung der günstigsten Wirk- und Blindlastverteilung in mehrfach gespeisten Hochspannungsnetzen), M. Schleicher. Elektrischer Betrieb, vol. 22, no. 3, Feb. 10, 1924, pp. 17-19. Describes apparatus for determining best load distribution in generators, which eliminates all calculation even with most complicated network; constructed by Siemens & Halske.

Network Theorem. A New Network Theorem, A. Rosen. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 916-918, 5 figs. Gives generalized theorem of which well-known three-ray star-mesh transformation is particular case; formula is of simple nature and great saving of labor results from its use; gives three examples of application.

Networks, Analytical Solution of. Analytical Solution of Networks, R. D. Evans. Elec. Jl., vol. 21, nos. 4 and 5, Apr. and May 1924, pp. 149-154 and 207-213, 23 figs. Explanation of how calculations may be made of short-circuit currents for different locations on power system, for proper application of circuit breakers, and to secure best operation of relay systems.

Networks, Interconnecting System for. New Type of High-Tension Network, P. H. Thomas. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 610-618, 1 fig. Presents a new type of interconnection for high-tension networks for economic supply of electric power over large areas having an already well developed load. Central idea is superposition of a high-tension network of single-circuit lines over whole district for purpose of supplying a medium in which current may flow in any general direction as changing conditions may dictate. See (discussion) in vol. 44, no. 1, Jan. 1925, pp. 58-65, 1 fig.

Networks, Protection of. The Protection of Supply Networks, W. Wilson. Electrician, vol. 92, no. 2401, May 23, 1924, pp. 624-627, 7 figs. Some critical notes on McColl system.

Operation. The Continuity and Regularity of Operation of Large Electric Systems, G. Semenza. Engineering, vol. 118, no. 3055, July 18, 1924, p. 112. Shows that improvement of service is an advantage both for consumer and producer, but perhaps more for producer. Causes of bad service.

Protection. Protection of Electric Systems Against Short Circuits and Insulating Defects (Protection des réseaux électriques contre les courts-circuits et les défauts d'isolement), V. Genkin. Revue Générale de l'Electricité, vol. 16, nos. 10, 11, and 12, Sept. 6, 13, and 20, 1924, pp. 379-387, 429-440, and 475-483, 70 figs. Discusses disconnecting as quickly as possible section suffering from defects without disturbing operation as a whole, and reviews various solutions proposed. Various protective systems. Bibliography.

Protective Gear for Electric Power Systems, H. Trencham. World Power, vol. 2, no. 12, Dec. 1924, pp. 328-333. Its justification and application; protective gear for generators and transformers; radial or dead-end feeders; alternative and parallel feeders; ring feeders.

Rural. Construction and Use of Charts for Rapid Calculation of Rural Distribution Systems [Note sur la construction et l'usage d'abaques permettant le calcul rapide des réseaux ruraux de distribution d'énergie (réseaux à courant triphasé à la fréquence de 50 p:s)], Olivié. Revue

Générale de l'Electricité, vol. 16, no. 16, Oct. 18, 1924, pp. 630-638, 9 figs. Deals with three-phase 50-period lines. Methods and charts for ready calculation.

Swedish Rural Electrification. Elecn., vol. 93, no. 2419, Sept. 26, 1924, pp. 347-349, 10 figs. Details of equipment used and distribution arrangements.

Rural Communities. Delivering Municipal Electric Power to Rural Communities, A. G. Lang. Am. City Mag., vol. 30, no. 2, Feb. 1924, pp. 161-163, 5 figs. Description of rural distributing system of Hydroelectric Power Commission of Ontario.

Short-Circuits, Effect and Prevention. Effect and Prevention of Short Circuits, B. G. Jamieson. Elec. World, vol. 83, no. 17, Apr. 26, 1924, pp. 815-817, 3 figs. By extending isolation of phases beyond generating stations to primary distribution points saving of investment and greater reliability will be gained even on small interconnected systems.

Survey. Conducting a Distribution Survey, E. G. Nichols and J. R. Eyre. Elec. World, vol. 84, nos. 15 and 16, Oct. 11 and 18, 1924, pp. 781-784 and 839-840, 7 figs. Objects that made it worth while; improvements in operation and economy made possible by it; how work was organized and carried on. Oct. 18: Transfer of field notes to permanent maps and records; value of survey to company; results obtained and perpetual inventory system.

Trouble-Handling System. Handling Trouble on the Detroit System, H. G. Granger. Elec. World, vol. 83, no. 3, Jan. 19, 1924, pp. 137-139, 7 figs. Describes organization of trouble department of Detroit Edison Co.; functions during 24 hr. every day in year; extensive telephone board to distinguish between customer complaint calls and calls from outside repair men.

Underground. A Study of Underground Distribution Systems for the City of New Orleans, W. R. Bullard. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1058-1062, 2 figs. Describes system, which as result of investigation, was selected to form basis for serving future growth of load in underground district of New Orleans and for eventually displacing present distribution system; economic comparison of several types of systems.

Underground Alternating-Current Network Distribution for Central Station Systems, A. H. Kehoe. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 545-554, 27 figs. Experimental arrangements for underground a.c. system; experience with combined light and power network on one set of mains; effect of voltage variation on incandescent-lamp illumination; tests on cables which indicate that for underground distribution conditions, low-voltage cables will eliminate arcing faults which high-voltage cable will not do; description of experimental system.

Voltage Increase. Increases in Distribution Voltage, H. P. Seelye. Elec. Light & Power, vol. 2, no. 5, May 1924, pp. 131-133, 5 figs. Discusses some of the factors which bear upon problem, in the adoption of a higher distribution voltage, of what that voltage shall be.

ELECTRIC DRIVE

Air Compressors. See AIR COMPRESSORS, Electric Motors for.

Boiler Rooms. See BOILER ROOMS, Electric Drive.

Calico-Printing Machines. See ELECTRIC MOTORS, A. C., Variable-Speed.

Cement Mills. See CEMENT MILLS, Electric Drive; ELECTRIC MOTORS, A. C., Synchronous.

Central-Station Auxiliaries. See CENTRAL STATIONS, Auxiliaries, Electric-Drive Developments.

Cost Comparison of Steam, Diesel, and. Maximum Prices for Current Supply (Höchstpreise für Stromlieferung), W. Windel. Elektrotechnische Zeit., vol. 45, nos. 38 and 39, Sept. 18 and 25, 1924, pp. 995-1000 and 1027-1032, 9 figs. Theoretical and practical comparison of cost of electric, steam, and Diesel drive, for threshing machines and machine tools. Discusses question of whether to buy current or produce it; cost of producing a kw-hr.

Gas Works. See GAS WORKS, Electric Drive.

Group vs. Individual. Group versus Individual Drives, C. H. S. Tupholme. Mech. World, vol. 76, no. 1973, Oct. 24, pp. 261-262. Author's impressions of field of application of both group and individual drives, and experiences of engineers in various engineering shops where author has made study of power-transmitting conditions.

When to Use Group and Individual Drives, R. W. Drake. Indus. Engr., vol. 82, nos. 2, 3, and 4, Feb., Mar., and Apr. 1924, pp. 56-60 and 106-107, 118-122, and 174-177, 15 figs. Comparative advantages and disadvantages of group and individual drives in industrial plants; points on layout, installation, and operation; fan drives; lineshaft losses.

Ice Plants. See ICE PLANTS, Electric Drive.

Irrigation Pumping. Electrical Applications to Irrigation Pumping, R. H. Cates. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1042-1046, 4 figs. Application of electric drive to pumping equipment in California.

Machine Tools. A New Reversing-Gear Arrangement for Individual Electric Drives (Eine neue Umsteuergetriebeanordnung für elektrischen Einzelantrieb), E. Lauer-Schmaltz. Maschinenbau, vol. 24, no. 8, Jan. 24, 1924, pp. 203-206, 7 figs. Describes two different designs of new type of motor, the flywheel ring motor, which together with a new system of mechanical reversing arrangement, offers advantages for transmission of larger amounts of power.

See also MACHINE TOOLS, Electrically Driven.

Machinery. See ELECTRIC MOTORS, Wood and Metal-Working Machinery.

Milling Machines. See MILLING MACHINES, Electric Drive.

Paper Mills. See PAPER MILLS, Electric Drive.

Purchased Power for Wire Plant. Improving Flexibility and Cost of Power. Iron Age, vol. 113, no. 6, Apr. 17, 1924, pp. 1141-1143, 6 figs. Tying up of own power stations with current from public-service company gives wire plant at Trenton, N. J., exceptional ease of control and freedom from interruption; details of new substation and power lines.

Rolling Mills. See ROLLING MILLS, Electric Drive.

Shipyards. Electrical Power Transmission for Shipyards, T. Schwarz. Eng. Progress, vol. 5, no. 5, May 1924, pp. 85-88, 7 figs. Show how all kinds of power transmission, especially hydraulic transmission, have been replaced by the electric drive, which has recently even mastered largest machines for handling plates.

Steel Mills. See ELECTRIC MOTORS, A. C., Synchronous; STEEL WORKS, Electric Drive.

Stokers. See STOKER, Electric Drive for.

Textile Mills. See TEXTILE MILLS, Electric Drive.

Transition from Steam to. The Transition from Steam to Electric Drive, E. E. Thomas. Power

House, vol. 17, no. 18, Sept. 20, 1924, pp. 21 and 42. Shows that continuity of operation of auxiliaries is often facilitated by house turbines, augmented by electrical ties to main bus, relay protection being included to assure service.

Woodworking Machines. See WOODWORKING MACHINES, Electric Drive.

ELECTRIC FURNACES

Acid. Make Electric Steel in South. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 312-315, 8 figs. Also Iron Trade Rev., vol. 74, no. 14, Apr. 3, 1924, pp. 913-916, 8 figs. New Orleans company specializing in sugar-mill machinery installs acid electric furnace to make railroad castings; metallurgical control insures uniform quality of metal poured.

The Manufacture of Acid Electric Steel for Commercial Castings, L. J. Barton. Am. Soc. Steel Treating—Trans., vol. 5, no. 4, Apr. 1924, pp. 369-398, 8 figs. Discusses manufacture of acid as made in electric furnace, for use in production of commercial castings; selection, segregation and use of scrap metal; details of charging melting furnace; melting-down conditions involved, and various types of slags obtained in both good and bad practices; production of special steels and various alloy steels.

Advantages. Electric Industrial Heating, H. M. Drake. Engineer, vol. 137, no. 3553, Feb. 1, 1924, pp. 114-116, 4 figs. Discusses practice and experiences in America; advantages of electric heating; author advocates more extensive use of electric heating in Great Britain.

Annealing. Electric Furnaces for Annealing of Oxide-Free Products (Elektrische Blankglühöfen), W. Rohn. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 42, Oct. 18, 1924, pp. 1101-1105, 8 figs. Requirements of annealing furnaces for metalworking practice; thermal efficiency of fuel-heated furnaces; technical and economic disadvantages of pickling; efficiency and profitability of electric annealing furnaces; advantages of annealed metal which is entirely free of oxide formation; principles of design and construction of electric annealing furnaces.

Medium Temperature Furnace Installations, C. F. Cone. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 494-503, 18 figs. See also Forging—Stamping—Heat Treating, vol. 10, no. 10, Oct. 1924, pp. 375-379, 8 figs. Describes regenerative car-type furnace for annealing of wire, installed in Buffalo plant of Fowler & Union Horse Nail Co.

Arc. Viewpoints in the Construction of Electric Arc Furnaces (Gesichtspunkte beim Bau von Lichtbogen-Elektroofenanlagen), K. Kerpely. Giesserei Zeitung, vol. 21, nos. 12, 13, and 15, June 15, July 1, and Aug. 1, 1924, pp. 242-247, 277-282, and 320-325, 20 figs. June: Discusses arc furnace in foundry; electric and mechanic equipment; comparison of efficiency of Heroult and Fiat furnaces. July: Electric arrangement of furnaces for high tension and low tension. Aug.: Furnaces and accessories.

Brass. Present Tendencies in Electric Brass-Furnace Practice, H. W. Gillett and E. L. Mack. U. S. Bur. Mines—Reports of Investigations, no. 2597, Apr. 1924, 10 pp. Also Brass Wld., vol. 20, no. 5, May 1924, pp. 163-166. Trend of developments in practice in last two years. Bibliography.

The Case of Electric Brass Melting, R. June. Iron Age, vol. 114, no. 7, Aug. 14, 1924, pp. 371-372, 1 fig. Production experience at Detroit plant of Federal-Mogul Corpn.

Brass, Refractories for. See REFRACTORIES, Electric-Brass-Furnace.

Bronze Foundry. Electric Furnace Practice in the Bronze Foundry, F. C. Heath. Am. Electrochem. Soc.—Advance paper for meeting Oct. 2-4, 1924, pp. 451-454. Foundry installed in Detroit, Mich., has installed 5 Detroit electric furnaces of indirect arc, rocking type.

Control Gear. An Electric Furnace Regulating Gear, H. J. Seymour. Power Engr., vol. 19, no. 218, May 1924, pp. 174-175, 2 figs. Describes one type of automatic apparatus for regulation of 2-phase electric furnaces.

Developments. Electric Furnace Developments, F. Hodson. Foundry Trade Jl., vol. 29, no. 398, Apr. 3, 1924, pp. 273-274. See also Iron & Coal Trades Rev., vol. 108, no. 2928, Apr. 11, 1924, p. 596, and Blast Furnace and Steel Plant, vol. 12, no. 7, July 1924, pp. 314-318, 8 figs. Growth of electric melting-furnace industry. Söderberg electrode.

See also ELECTROMETALLURGY, Developments.

Electrode-Regulating Motors. Electrode Regulating Motors of Electric Steel Furnaces (Die Elektrodenreguliermotoren der Elektrostahlöfen), K. Kerpely. Giesserei-Zeitung, vol. 21, no. 8, Apr. 15, 1924, pp. 153-157. Principle and design of d.c. regulating motors; calculation of speeds; method of three-phase regulation; induction motor; speed regulation and braking.

Electrodes. The Use of Söderberg Continuous Electrodes in Electric Steel Furnaces (Die Verwendung der Söderbergschen Dauerelketrode an Elektrostahlöfen), W. Eilender and L. Lyche. Stahl u. Eisen, vol. 44, no. 14, Apr. 3, 1924, pp. 364-368. Experimental equipment with continuous electrode on one phase of 6-ton Heroult furnace; main equipment on 3-phase operation of same furnace; working results; reducing cost of electric-steel practice; thermal efficiency of 6-ton Heroult furnace.

See also ELECTRODES.

Enameling. Vitreous Enameling with the Electric Furnace, E. F. Collins. Fuels & Furnaces, vol. 2, no. 12, Dec. 1924, pp. 1273-1274. Advantages of electric furnace for producing vitreous enamel ware.

See also ENAMELING, Electric Furnaces for; FURNACES, ENAMELING, Electric.

Fiat. See Arc.

Heat-Treating. Economics of Electrically-Heated Annealing and Hardening Furnaces (Die Wirtschaftlichkeit des elektrisch beheizten Glüh- und Härteofens). Elektrotechnischer Anzeiger, vol. 41, nos. 148 and 149, Sept. 13 and 16, 1924, pp. 802 and 804, and 812-813. Details of various types of furnaces and their operation; advantages of electric furnaces.

Electric Furnace for Continuous Hardening and Tempering Wire, R. H. MacGillivray. Am. Electrochem. Soc.—Advance paper no. 10, for meeting Oct. 2-4, 1924, pp. 149-151, 3 figs. on supp. plates. Description of furnace, consisting essentially of two units, one an electric-heated air-hardening furnace, approximately 5.48 m. in length, and other an electric-heated, lead drawing pan, quenching being done in oil.

Electric Furnace for Heat Treating Steel Wire, R. H. MacGillivray. Elec. Wld., vol. 84, no. 23, Dec. 6, 1924, pp. 1210-1211, 2 figs. Consists of two units, one an electrically heated air-hardening furnace, the other a hardening furnace having nickel-chromium retort with nickel-chromium resistance elements on top and bottom.

Electric Furnace Installation, R. S. Sawdey. Iron & Steel Engr., vol. 1, no. 9, Sept. 1294, pp. 487-489, 4 figs. Describes electric furnaces installed at Van Dorn Iron Works Co., Cleveland,

Ohio, installation consists of four double-end box-type furnaces.

Electric Furnace Proves Best, J. Watson. Elec. Wld., vol. 83, no. 8, Feb. 23, 1924, p. 376, 1 fig. Special application for hardening clipper plates proves very economical; costs and operating results.

Electric Furnaces for the Heat Treatment of Razor Blades. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 713-714, 4 figs. Wild-Barfield electric hardening and tempering furnaces, installed at works of Wilkinson Sword Co. for heat treatment of hollow-ground blades for safety razors.

Electric Heat-Treating Costs. Elec. Wld., vol. 84, no. 20, Nov. 15, 1924, pp. 1060-1061, 1 fig. Figures on heat-treating costs obtained from Standard Equipment Co. of Cleveland.

Treating High-Speed Tools. Iron Age, vol. 113, no. 4, Jan. 24, 1924, p. 388, 1 fig. New furnace installed at Gleason Works, Rochester, N. Y., with special equipment for high temperatures.

Using Electric Heating Furnaces, A. E. White. Iron Trade Rev., vol. 75, no. 19, Nov. 6, 1924, pp. 1229-1231. Exhaustive survey of electric heat-treating installations provides data for recommended design of furnaces; use of electric heat for forging units and for cyaniding still is in experimental stage.

See also FURNACES; HEAT-TREATING, Electric.

Heating in Vacuum. Apparatus for Heating Electrically in a Vacuum to a High Temperature (Sur un dispositif permettant de chauffer électriquement dans le vide à haute température), P. Lebeau and M. Picon. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1151-1153. Apparatus consists essentially of tube of carbon, molybdenum, or tungsten, which forms resistance and which is placed in flask of Pyrex glass or quartz; authors describe use and calibration of optical pyrometer of double-scale, disappearing-filament type which was used in connection with apparatus.

Heroult. See Arc; Electrodes.

High-Frequency Inductive Heating. High-Frequency Inductive Heating, D. Wilcox. Iron Age, vol. 114, no. 25, Dec. 18, 1924, p. 1617, 1 fig. Application where sections of bars or rods must be heated to high temperatures in electric furnace.

High-Temperature. Economical Design of Electric Furnaces for High Temperatures (Ett försök till en rationell konstruktion av elektriska högtemperaturugnar), O. Stålhane. Teknisk Tidskrift, vol. 54, no. 40, Oct. 4, 1924, pp. 171-174 (Elektroteknik), 3 figs. Furnace combines use of a resistance, which has form of a coil, with an electric arc connected in series with said coil and made to rotate under influence of said magnetic field. Temperatures of over 1755 deg. cent. have been obtained by use of only 1000 watts.

Induction. A Six-Ton Induction Furnace Installation, M. Unger. Gen. Elec. Rev., vol. 27, no. 8, Aug. 1924, pp. 498-503, 12 figs. Details of new General Electric Co. three-ton furnace and its auxiliaries, yielding high-grade melt of extreme uniformity.

Horizontal Ring Induction Furnaces, J. A. Seede. Iron Age, vol. 114, no. 20, Nov. 13, 1924, pp. 1281-1282, 3 figs. Comparison with electric arc furnaces for metals; attractive features of induction melting; results from 6-ton unit.

Iron-Melting. Nine Tons in a 3-Ton Furnace, L. J. Burton. Foundry, vol. 52, no. 10, May 15, 1924, pp. 401-403, 9 figs. Capacity of electric furnace increased to melt sufficient iron to pour large gear wheel; operating door banked up about 10 in. with cement made of white sand and sodium silicate; operation at plant of Dibert, Bancroft & Ross Co., New Orleans.

See also IRON METALLURGY, Electric Smelting.

Iron-Ore Reduction. Electric Reduction Furnace Iron, R. C. Gosrow. Iron Trade Rev., vol. 74, no. 15, Apr. 10, 1924, pp. 982-983 and 991. States that pig iron made in electric reduction is of high quality and adapted to foundry and steel-making use.

Low-Grade Iron and Scrap. Using the Electric Furnace, J. T. MacKenzie. Foundry, vol. 52, no. 21, Nov. 1, 1924, pp. 859-860. Company making cast-iron pipe installs electric melting unit to handle low grades of iron and scrap; direct metal tried out; segregation of manganese sulphide causes trouble. (Abstract.) Paper read before Am. Foundrymen's Assn.

Medium- and Low-Temperature. Medium and Low Temperature Applications, E. A. Hurme. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 503-513, 24 figs. Application of small medium-temperature heat-treating furnaces; hearth-type tool-treating furnaces; tool-steel tempering furnace; large-size medium-temperature furnaces; furnaces for annealing castings; application of electric heat to annealing and hardening wire; applications of low-temperature heating; baking of motor armature; enameling; electric steam boilers; sheet-mill roll heaters.

Melting. Electric Melting Furnaces, J. A. Seede. Iron & Steel Eng., vol. 1, no. 9, Sept. 1924, pp. 490-494, 8 figs. Review of development; refinements in furnace design, accessories, and operation; increasing productive capacity of furnace.

Melts Iron in Twin Electric Furnaces, A. W. Bryant. Foundry, vol. 52, no. 14, July 15, 1924, pp. 556-559, 4 figs. Iron Trade Rev., vol. 75, no. 4, July 24, 1924, pp. 226-228, 4 figs. At plant of Kelly & Jones Co., Greensburg, Pa., who manufacture a line of plumbing and valve fittings in gray iron, steel and malleable iron, two acid-lined units, 1½ tons capacity each, mounted on turntable 180 deg. apart and having single set of electrodes, provide small batches of hot metal at short even intervals.

Multiple System of Electric Melting, E. A. Hanff. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 999-1003, 6 figs. "Twin-furnace" plan as applied to steel foundry; greater speed in melting and less equipment claimed.

Mercury Poisoning. Mercury Poisoning from Electric Furnaces, L. Jordan and W. P. Barrows. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 898-901. Investigation of four cases of subacute or chronic mercurial poisoning among men operating high-frequency induction furnaces; describes resulting improvements made to furnaces.

Metal-Refining. Refining Metals Electrically, L. J. Barton. Serial article in Foundry, vol. 52, beginning June 1, and ending 15, 1924, 29 figs. June: Compares electric melting with other and earlier methods of producing steel for castings. June 15: Primary consideration which should govern selection of electric furnace. July 1: Compares basic and acid-lined furnaces. July 15, Aug. 1, 15 and Sept. 1: Discussion of furnace installation, maintenance and operation, from practical standpoint. Sept. 15: Points which should be watched in buying scrap. Oct. 1: Two-slag and one-slag methods of making basic plain carbon steel. Oct. 15: Chemical reactions. Nov. 1: Advantages and methods of using fluorspar and other slags. Nov. 15: Determining final pouring temperature; mixing ladle additions. Dec. 1: Slag basic process; making acid steel; melt-

ing down charge. Dec. 15: Analysis controlled by slag manipulation; causes of oxidation.

Metallurgical. Small Electric Furnace for White Metal and Aluminum (Elektrischer Kleinschmelzofen für Weissmetall und Aluminium), W. Rohn. Zeit. für Metallkunde, vol. 16, no. 10, Oct. 1924, pp. 396-398, 2 figs. Design and operation of a small furnace for casting temperatures of up to 800 deg. cent.; consumption of power, efficiency and output of furnace, and results of running.

The Economies of Electric Heat in Metallurgical Processes, D. D. Miller. Iron & Steel Engr., vol. 1, no. 3, Mar. 1924, pp. 129-135. Enumerates advantages of use of electric heat.

Pig-Iron. New Norwegian Electric Pig Iron Furnace, F. Hodson and M. Sem. Iron Age, vol. 113, no. 22, May 29, 1924, p. 1585, 1 fig. Open-top furnace successfully operating with charcoal or coke; new ore-reduction process.

The New Norwegian Electric Pig Iron Furnace, F. Hodson and M. Sem. Jl. of Electricity, vol. 53, no. 3, Aug. 1, 1924, pp. 92-93, 4 figs. Results of tests made on new type of electric furnace; furnace was in operation continuously for period of year and a half during test.

Principles and Design. Electric Furnaces (Les fours électriques). Electricien, vol. 55, nos. 1347 and 1348, May 1 and 15, 1924, pp. 193-197 and 221-225, 15 figs. General considerations; electrothermal problem; resistance furnaces; arc and induction furnaces.

Refractories, Effect of Deoxidizing Slag on. Fluorine in the Deoxidizing Slag, and Its Influence on Refractories in Basic Electric Furnace Practice, F. T. Sisco. Am. Electrochem. Soc.—Advance paper no. 19, for meeting Oct. 2-4, 1924, pp. 257-272. Deoxidizing slag as first formed; analyses of electric-furnace deoxidizing slags; advantages and disadvantages of fluorine in deoxidizing slag; temperature and fluidity of slag and their effect on roof and walls; etc.

Resistance. An Electric Graphite Resistance Furnace, H. Bruan, A. L. Mehring and W. H. Ross. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 821-822, 2 figs. Describes furnace which combines features of both Arsem and Tucker furnaces with some new features, and which was designed for such special reactions as those involved in pyrolytic treatment of phosphate rock under non-oxidizing conditions.

Resistor. Granular Carbon Resistor Furnaces, M. M. Austin. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 156-157, 2 figs. Describes two types in which some of disadvantages of such furnaces have been overcome and their construction simplified.

The Granular Resistor Furnace, O. P. Watts. Optical Soc. Am.—Jl., vol. 9, no. 6, Dec. 1924, pp. 705-707. Useful for heating tubes and crucibles to temperatures attainable only by electric furnace, and where greater uniformity of heat is required than can be obtained by arc; it is most convenient method of melting metals and alloys in amounts of 100 to 1000 grams; voltage and power requirements; operation.

The Metallic Resistor in Industrial Heating Furnaces, E. F. Collins. Chem. & Met. Eng., vol. 30, nos. 24 and 25, June 16 and 23, 1924, pp. 936-941 and 981-985, 18 figs. Application and design of electrical heating equipment; comparison of types of resistors; advantages of furnace. Chemical, physical, and economic laws governing use of equipment.

Steel. Operating Data for an Electric Steel-Melting Furnace, F. L. Landon. Jl. Electricity, vol. 53, no. 12, Dec. 15, 1924, pp. 434-436, 8 figs. Operating results from a 6-ton 3-phase Heroult furnace in Sacramento shops of Southern Pac. Co.

Progress in the Production of Electric Steel (Die Fortschritte der Elektrostahlerzeugung), F. Sommer. Stahl u. Eisen, vol. 44, nos. 18, 19, and 20, May 1, 8, and 15, 1924, pp. 490-496, 526-530, and 553-558 and (discussion) 558-560. Statistical data; arc and induction furnace; economical and metallurgical features.

Some Applications of Electric Heat to the Heheating of Steel, E. F. Collins. Fuels & Furnaces, vol. 2, nos. 6, 7, 8, 9, and 10, June, July, Aug., Sept., and Oct., 1924, pp. 575-578, 655-660, 791-794, 939-942, and 1065-1067, 9 figs. Brief review of past and present day conceptions of heat and laws governing it. Metallic resistors in unmuffled furnaces. Various types of resistor furnaces. Automatic temperature control of electric furnaces. Chemical, mechanical, physical, and economic laws involved in selection of heat source.

The Care of the Electric Steel Furnace, D. D. MacGuffie. Metal Industry (Lond.), vol. 25, no. 18, Oct. 31, 1924, pp. 429-430. Discusses chief points requiring attention in case of electric steel furnaces; deals chiefly with Heroult basic furnace, giving particulars as to procedure for lining out furnace, making it ready for melting, charging, and points of concern in melting and finishing off metal.

The Practical Economics of the Electric Steel Furnace, D. D. MacGuffie. Metal Industry (Lond.), vol. 25, no. 21, Nov. 21, 1924, pp. 501-502. Taking 3-ton Heroult furnace as practical example, author discusses chief points in equipment, operation, and maintenance of electric furnaces, from point of view of obtaining most economical results.

Thermostats for. See THERMOSTATS.

ELECTRIC FUSES

Cartridge. Cheap and Entirely Safe Cartridges for Cut-Outs (Die alte Forderung nach billigen und doch völlig betriebssicheren Sicherungspatronen), O. Ely. Elektro-Jl., vol. 4, no. 6, June 1924, pp. 154-156, 10 figs. Details of construction of N-Diazed cartridges complying with all requirements of German Electric Assn.

Potential-Transformer, Tests on. Potential Transformer Fuse Tests, P. M. Hess. Elec. Wld., vol. 83, no. 10, Mar. 8, 1924, pp. 467-471, 6 figs. Extensive investigation conducted into safety and reliability of 13,200-volt cartridge and expulsion fuses; conclusions and test data show how to secure improvements.

Safety. Electric Starting Devices and Fuses with Reference to Safety, G. F. MacWilliams. Coal Mine Mgmt., vol. 3, no. 10, Oct. 1924, pp. 47-52 and 54. Notes on automatic circuit breakers; safety switches; keeping switches clean; starters; line fuses; grounding; line protectors; switch handles.

Selection and Maintenance. Care in Choosing and Maintaining Fuse and Switches May Prevent Many Accidents, J. F. MacWilliams. Coal Age, vol. 26, no. 14, Oct. 2, 1924, pp. 468-471, 5 figs. Fuses should be kept in fireproof cabinets; automatic circuit breakers of 2000-amp. capacity or over should be remotely controlled; each phase in a three-phase circuit should be provided with separate fuses. From paper read before Nat. Safety Council.

Tests. Low-Tension Tests on High-Tension Fuses and Resistors, P. M. Hess. Elec. Wld., vol. 84, no. 3, July 19, 1924, pp. 107-109, 4 figs. Results of laboratory investigations made by Pennsylvania Water & Power Co. at Holtwood to determine performance of fuses with and without resistors.

Time-Element Purposes. The Use of the Fuses for Obtaining an Exact Time Element, W. Wilson. World Power, vol. 1, no. 2, Feb. 1924, pp. 91-99, 5 figs. Discusses use and performance of fuses for time-element purposes, and deduces methods whereby their characteristic curves may be drawn as result of minimum of experimental data.

ELECTRIC GENERATORS

[See also ELECTRICAL MACHINERY.]

Alternating-Current. See ELECTRIC GENERATORS, A. C.

Armatures. See ARMATURES.

Auxiliary, Parallel Operation. Parallel Operation of Auxiliary Generators, H. B. Seeley. Power Plant Eng., vol. 28, no. 24, Dec. 15, 1924, pp. 1257-1260, 6 figs. New arrangement consisting of small auxiliary generator direct connected to main unit presents new operating problems.

Brushes. See BRUSHES.

Commutation. See COMMUTATION.

Commutators, Heating of. See COMMUTATORS, Heating of.

Design. See ELECTRICAL MACHINERY, Design.

Direct-Current. See ELECTRIC GENERATORS, D. C.

Fires in, Extinction of. Extinction of Fires in Generators by Means of Carbon Dioxide, C. L. Jones. Gen. Elec. Rev., vol. 27, no. 10, Oct. 1924, pp. 650-657, 4 figs. Details of a series of experiments made with carbon dioxide at Mellon Inst. Indus. Research. Tests were conducted on pieces of generator coil. Discusses effects of windage, gas composition, air temperature, copper temperature, and insulating materials.

Heating. See ELECTRIC MOTORS, Heating.

Installation. See ELECTRIC MOTORS, Installation.

Operating Costs. Some Factors Affecting the Working Costs of Small Electric Generating Sets, E. G. Kennard. Instn. Elec. Engrs.—Jl., vol. 62, no. 332, Aug. 1924, pp. 713-719, 5 figs. Comparisons of costs for generating current, using various types of small internal-combustion engines under various working conditions. How working costs per unit of electricity are influenced by various factors, viz., type of engine, nature and magnitude of load, price and calorific value of fuels.

Turbo. See TURBO-GENERATORS.

Ventilation. Ventilation of Electrical Generators, M. D. Engle. Elec. Light & Power, vol. 2, no. 4, Apr. 1924, pp. 13-17 and 60, 9 figs. Methods of obtaining cooling air for large generators; specification for a generator air cooler.

Wind-Driven. Electricity and Wind Power (Elektrizität aus Windkraft), L. Riefstahl. Gewerbefleiss, vol. 103, no. 10, Oct. 1924, pp. 165-172, 7 figs. Particulars of A. E. G. wind-electric plant as installed on Dummerstorf Estate at Rostock, with a 60-cell storage battery capacity of 580 ampere hours.

ELECTRIC GENERATORS, A. C.

Additional Losses. Additional Losses in Synchronous Machines and Their Measurement (Zusätzliche Verluste in Synchronmaschinen und ihre Messung), R. Rüdenberg. Elektrotechnische Zeit., vol. 45, nos. 3 and 4, Jan. 17 and 24, 1924, pp. 37-41 and 59-63, 28 figs. Investigation of parasite stray fields which develop in synchronous machines and which are located mainly in air gap and in winding heads; they are shown to be principal cause for additional losses which, therefore, can be predetermined by calculation; it is also shown that additional losses can be determined with great accuracy by means of short-circuit test on finished machine.

Air Gap in Salient-Pole, Shape of. The Shape of Pole-Shoe Required to Produce a Sinusoidal Distribution of Air-Gap Flux Density, B. Hague. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 921-929, 10 figs. Gives theory of commonly used method in which reluctance of gap from point to point is adjusted to value proper to sinusoidal flux by shaping pole face to give gap of varying length, longer at tip than at center of pole; deals with flat and circular armatures with any number of poles; numerical example illustrating theory given in text.

Assembling. Assembling 22,000-Kva. Waterwheel Generator, R. Brown. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 278-281, 7 figs. Involved special method of handling field poles and adjusting air gap to relieve load on bearings. Drying out windings and placing machine in service.

Assembling Generator Rotors, Ralph Brown. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 566-567, 3 figs. Describes how generator rotors were assembled at Caribou plant of Great West. Power Co.

Drive. House Service Generators; Their Types and Field of Application, W. R. Herod. Gen. Elec. Rev., vol. 27, no. 8, Aug. 1924, pp. 549-554, 2 figs. Details of house service generators driven by main turbine shaft, by separate steam turbine, by turbine and motor.

Excessive Voltage in. Excessive Voltage in Generators, W. V. Lyon. Elec. World, vol. 84, no. 15, Oct. 11, 1924, pp. 784-785, 5 figs. Account of unusual test data brought to writer's attention; possible explanation of result obtained involves point in theory of a.c. generators about which little has been written.

Exciters. Armature Copper Losses of a Rotary Current Exciter (Die Ankerkupferverluste der vom Netz erregten Drehstromerregermaschine), W. Weiler. Elektrotechnische Zeit., vol. 45, no. 41, Oct. 9, 1924, pp. 1080-1083, 13 figs. Develops formulas for calculating copper losses similar to those in use for rotary converters.

Gas-Driven. Coupling Three-Phase Alternators Driven by Gas Engines (Couplage d'alternateurs triphasés commandés par moteurs à gaz), A. Discry. Revue Générale de l'Electricité, vol. 16, no. 19, Nov. 8, 1924, pp. 731-739, 2 figs. Discusses effect of power factor on stability of coupling in a system comprising central stations of metallurgical works, each feeding a medium voltage system, and interconnected with high-tension lines.

High Frequency Alternators, C. M. Laffoon. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 416-420, 13 figs. General résumé of high frequency alternators; inductor-type alternator; cylindrical-type high-frequency generators; characteristic curves.

Induced Voltages in Excitation Systems. See VOLTAGES, Induced, Hazards of.

Induction. Recent Progress in the Field of Induction Generators and Induction Reactive Machines (Neuere Fortschritte auf dem Gebiete der Asynchron-Generatoren und Asynchron-Blindleistungsmaschinen), M. Schenkel. Elektrotechnische Zeit., Special no., Aug. 28, 1924, pp. 15-17, 5 figs. See also Elektrotechnische Zeit., vol. 45, no. 47, Nov. 20, 1924, pp. 1265-1270, 9 figs. Discusses separately excited commutators and their connection with such three-phase induction generators, leading to new reactive machine of a synchronous character, very suitable for improving power factor.

Operation. Operation of A. C. Generating Equipment, V. E. Johnson. Power Plant Eng.,

vol. 28, nos. 2, 3, 6, 8, 11, and 14, Jan. 15, Feb. 1, Mar. 15, Apr. 15, June 1, and July 15, 1924, pp. 142-144, 183-186, 339-342, 438-440, 600-603, and 758-759, 53 figs. Fundamental considerations which serve as foundation for practical study. Jan. 15: Representing alternating currents by vectors. Feb. 1: Effect of capacity in a.c. circuits; power factor; wattless component. Mar. 15: 3-phase alternator, principles of construction and operation. Apr. 15: Study of characteristics of generators under various conditions. June 1: Conditions necessary for parallel operations, synchronizing, division of load, power-factor correction. July: Summary of principles as applied to generators; hints regarding care of machines.

Parallel Operation. Parallel Operation of Direct-Connected Auxiliary Generators, H. B. Seeley. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 387-390, 6 figs. Discusses operating shaft-driven auxiliary generators in parallel with other sources of auxiliary power, with parallel operation with main bus through transformers, parallel operation with turbine-driven house unit, parallel operation of two-shaft generators.

Phenomena. A Method for Presenting Analytically Infinite Form Periodic Functions, Polygonal or Irregular (Un metodo per la rapprensentazione analitica sotto forma finita delle funzioni periodiche poligonali o communque irregolari), L. Laboccetta. Elettrotecnica, vol. 11, nos. 19, 20, and 21, July 5, 15, and 25, 1924, pp. 442-452, 471-480, and 496-502, 53 figs. Discusses sinusoidal diagrams of variable elements of currents expressed as function of time or angle, on basis of which other periodic electromagnetic phenomena in generators and electric motors are studied.

Polyphase. General Diagram of Polyphase Machines with Cylindrical Stator and Rotor (Diagramme général des machines polyphasées à stator et rotor cylindriques), J. Bethenod. Revue Générale de l'Electricité, vol. 16, no. 1, July 5, 1924, pp. 5-7, 1 fig. Applies new kind of diagram which takes into account magnetic saturation.

Polyphase High-Frequency. Note on Polyphase High-Frequency Alternators, S. Chiba. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 947-954, 18 figs. Calculations lead to conclusion that utilization of armature or stator periphery is inherently far better in polyphase than in single-phase machines.

Power Loads from, Totalizing of. Totalizing Alternating-Current Power Loads, V. H. Todd. Power, vol. 60, no. 2, July 8, 1924, pp. 47-49, 7 figs. Methods that may be used to obtain a combined reading of a number of power loads supplied from a.c. generators.

Repulsion. See ELECTRIC MOTORS, A. C., Repulsion, Atkinson Type.

Self-Excitation. Charging of the Transmission Line and Self-Excitation of Alternators, Masakazu Takahashi. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 432, July 1924, pp. 683-715, 29 figs. Describes precise nature of line-charging characteristic and saturation curve and gives graphical method of obtaining saturation curve from no-load saturation curve and short-circuit characteristic; results of actual tests coincide fairly well with this method. (In Japanese with abstract in English.)

Self-Exciting Alternators, F. Contell. Elec. Rev., vol. 94, no. 2411, Feb. 8, 1924, pp. 204-205, 1 fig. Describes machine for which it is claimed that it is possible to excite a.c. generator with current from generator itself; essential part of invention consists in special way in which alternator is excited and in use of auxiliary alternator when main generator is being started up.

Shearing Stresses. Average Shearing Stress in D. C. Machines (Die mittlere Schubspannung bei Gleichstrommaschinen), K. Metzler. Elektrotechnik u. Maschinenbau, vol. 42, nos. 45 and 46, Nov. 9 and 16, 1924, pp. 649-658 and 669-675, 24 figs. Reviews equations available from which to design new types of machines.

Short-Circuit Currents. Alternator Short-Circuit Currents, A. Fraenckel. Electrician, vol. 92, no. 2388, Feb. 22, 1924, pp. 224-225, 4 figs. Calculation of sudden rushes based on physical phenomena. Abstract from Elektrotechnische Zeit.

Short-Circuits. Short Circuits of Alternating-Current Generators, C. M. Laffoon. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 736-743, 17 figs., and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1187-1190, 1 fig. Presents physical conception and simple non-mathematical analysis of short-circuit phenomena of alternating-current generators. Formulas are developed for maximum instantaneous values of armature and field short-circuit current delivered by both single and polyphase generators.

65,000-Kva. The 65,000-Kv.-a. Generator of the Niagara Falls Power Company, W. J. Foster and A. E. Glass. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 365-372, 11 figs. Details of novel features, including stator, stator core, stator winding, rotor spider, poles and field coils, upper bearing bracket, guide and thrust bearing, oiling system, excitation generators, etc.

The 65,000-kv.-a. Vertical Waterwheel Generators for the Niagara Falls Power Company, M. C. Olson and E. B. Plenge. Gen. Elec. Rev., vol. 27, no. 2, Feb. 1924, pp. 90-97, 17 figs. Details of design of electric generator placed in operation Dec. 1923, measuring 31 ft. outside diameter and weighing 750 tons; its operation, combined with that of two similar machines now being built, will furnish an additional 100,000 hp. without diverting more water from Falls.

Synchronous, Stray Reactance in. Determination of Stray Reactance in Synchronous Alternators (Sur la détermination de la réactance de dispersion des alternateurs synchrones), J. Fallou. Revue Générale de l'Electricité, vol. 16, no. 13, Sept. 27, 1924, pp. 491-493, 2 figs. Describes simple method applicable to any three-phase alternator.

Turbo-Alternators. See TURBO-ALTERNATORS.

Vector Diagrams. Determination of the Coefficients for the Potier Vector Diagram for Alternators (A propos de la détermination des coefficients du diagramme de Potier appliqué aux essais des alternateurs), J. Le Monnier. Revue Générale de l'Electricité, vol. 15, no. 13, Mar. 29, 1924, pp. 531-532, 1 fig. Points out that method commonly used for separating out effects of armature reaction and armature reactance are difficult to apply exactly, and outlines method whereby satisfactory results can be obtained.

Winding, Losses in. See ELECTRICAL MACHINERY, A. C. Windings, Losses in.

ELECTRIC GENERATORS, D. C.

Armatures. See ARMATURES.

Bipolar. The Belt Driven Edison Bipolar Dynamos, W. S. Andrews. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 163-168, 7 figs. Sketch of some of Edison's historic dynamos, giving details of design in tabular form.

Commutation. Armature Reaction and Commutation, G. Windred. Electricity, vol. 38, nos. 1739 and 1740, Mar. 7 and 14, 1924, pp. 122-123 and 141-142, 5 figs. Description of primary concepts of modern practice in commutation of d.c. generators; elimination of sparking.

Constant Voltage at Variable Speed. The Latour System of D.C. Generator at Constant Voltage and Variable Speed (Dynamo à courant con-

tinu à tension constante et à vitesse variable, systeme Marius Latour). Revue Générale de l'Electricité, vol. 15, no. 3, Jan. 19, 1924, pp. 97-99, 6 figs. If small series motor is fastened to shaft of compound-wound generator and is connected in series with shunt winding of generator, latter will give constant voltage at variable speed; such system has been patented by Marius Latour, who simplified arrangement by combining motor with generator by placing two auxiliary brushes upon commutator of generator and providing auxiliary magnetic field on stator.

Low Voltage. Stability of Direct-Current Generators, C. Lynn. Elec. Jl., vol. 21, no. 7, July 1924, pp. 304-308, 6 figs. Discusses d.c. generators separately excited and self-excited; gives no-load and full-load saturation curves; d.c. generators used as exciters for a.c. generators.

Moment of Inertia, Determination. Method of Experimentally Determining the Moment of Inertia of a Generator for a Special Case (Méthode de détermination expérimentale d'un moment d'inertie d'une dynamo, dans un cas particulier), J. Foerster. Revue Générale de l'Electriticté, vol. 15, no. 5, Feb. 2, 1924, pp. 163-164, 1 fig. Method of determining moment of inertia of d.c. shunt-wound dynamo, based on knowledge of intensity of current in function of time; method is said to be more convenient in certain cases than habitual method.

Self-Excitation. The Self-Excitation of the Dynamo, H. J. S. Heather. World Power, vol. 2, no. 10, Oct. 1924, pp. 232, 6 figs. Deals with self-excitation in cast of series- and shunt-wound machines.

Welding Dynamo. See ELECTRIC WELDING, Dynamo for.

ELECTRIC LAMPS

Arc. See ELECTRIC LAMPS, ARC.

Burning Hours, Calculation of. The Calculation of Lamp Burning Hours, W. Atkins. Post Office Elec. Engrs. Jl., vol. 17, Pt. 1, Apr. 1924, pp. 24-25, 1 fig. Chart designed to enable calculations to be made quickly and easily with reasonable accuracy.

Fittings. Internal Illumination by Various Types of Electric Lamp Fittings (Alcuni rilievi sperimentali sulla illuminazione di interni), G. Peri. Elettrotecnica, vol. 11, no. 23-24, Aug. 15-25, 1924, pp. 558-563, 11 figs. Results of illumination measurements made on working plane in room 10.5 by 6.15 m. and of average height of 4.5 m., using six different types of fittings.

Incandescent. See ELECTRIC LAMPS, INCANDESCENT.

Mercury-Vapor. A Capillary Mercury Lamp, J. H. Vincent and G. D. Biggs. Jl. of Sci. Instruments, vol. 1, no. 8, May 1924, pp. 242-246, 6 figs. Details of construction and behavior of lamp, which consists of an open U-tube. Can be constructed to operate on any direct voltage from 100 upward, takes very little current, and has no limit to its working life.

The Mercury-Arc Lamp as Spark Gap and Interrupter (Die Quecksilberlampe als Funkenstrecke und Unterbrecher), W. Burstyn. Jahrbuch der drahtlosen Telegraphie u. Telephonie, vol. 23, no. 1, Jan. 1924, pp. 8-12, 15 figs. With aid of Hewitt "starting band," which is small condenser formed between mercury, glass wall, and narrow metal band around lamp tube, mercury lamp may be artificially ignited so as to start with voltage below critical potential; lamp so started may be used as controlled-impulse spark gap for rigid coupling, using direct current of few hundred volts as operating voltage; combination of artificial starting and stopping permits lamp to be used as interrupter for spark coils, giving up to 1000 interruptions per sec.

Testing Laboratory. See LABORATORIES, Germany.

ELECTRIC LAMPS, ARC

High-Brilliancy. New Experiments on the Source of Light of Very High Intrinsic Brilliancy (Neue Untersuchungen über eine Lichtquelle von sehr hoher Flächenhelligkeit), H. Gerdien and A. Lotz. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 515-518, 1 fig. Shows that intrinsic brilliancy can be increased to four times that of positive crater of pure carbon arc.

Tungsten. Tungsten Arc Lights with Increased Intrinsic Brilliancy (Wolframbogenlampen mit erhöhter Flächenhelle), C. Müller. Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 250-253, 3 figs. Describes tungsten arc lights in which intrinsic brilliancy is considerably increased by means of suitable articulation of surfaces and increased efficiency; results of experiments in which electrodes made of sintered tungsten particles were used.

ELECTRIC LAMPS, INCANDESCENT

Candlepower Measurement. The Measurement of Candle-power by Means of the Photo-electric Cell, F. K. Moss. Gen. Elec. Rev., vol. 27, no. 9, Sept. 1924, pp. 592-601, 8 figs. Describes investigation made to determine serviceability of photoelectric cell to measure mean spherical candlepower of incandescent lamps. Photometric technique is outlined, limitations of application observed, and results are shown to be distinctly encouraging.

Efficiency. Variations of Voltage in Distributing Lines and Their Effect on Incandescent Lighting (Le variazioni della tensione nelle reti di distribuzione e la loro influenza sulla economia della luce prodotta con lampade a incandescenza), A. Asta. Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 650-660, 13 figs. Characteristics of lamps, life of lamps, calculation of current, choice of lamps for a given current, etc.

Efficiency and Life Tests. Lamp Efficiency and Life Tests, J. F. Skogland and J. Franklin Meyer. Elec. World, vol. 84, no. 25, Dec. 20, 1924, pp. 1302-1304. Consistent results from tests at different efficiencies; average life efficiency bears constant ratio to initial efficiency. Published by permission of U. S. Bur. Standards.

Glow. See Neon.

Machinery for. Incandescent Lamp Machinery. Machy. (Lond.), vol. 23, no. 599, Mar. 20, 1924, pp. 807-808, 2 figs. Machines made by Chas. Eisler, Newark, N. J., employed respectively for forming tube in end of lead wires, and for welding filament and lead wires together.

Neon. Notes on Some Electrical Properties of the Neon Lamp, U. S. Oschwald and A. G. Tarrant. Physical Soc. of Lond.—Proc., vol. 36, part 4, June 15, 1924, pp. 262-268 and (discussion) 278-280, 4 figs. Discusses wave form of oscillating neon lamp, maximum frequency and persistence of ionization in neon lamp.

On Certain Properties of the "Osglim" Neon-Filled Lamp, J. H. Shaxby and J. C. Evans. Physical Soc. of Lond.—Proc., vol. 36, part 4, June 15, 1924, pp. 253-261, and (discussion) 27-280, 5 figs. Discusses characteristic voltage and current curve, illustrations of use of lamp as indicator in commutator method of measuring frequency of alternating currents.

Some Electrical and Optical Properties of Neon Glow Lamps, E. Karrer and A. Poritsky. Optical Soc. Am.—Jl., vol. 9, no. 3, Sept. 1924, pp. 323-335, 12 figs. Data on relative intervals of light and darkness, distribution of luminosity over potential cycle when glow lamp is excited with alternating potential, efficiency of lamp as a func-

tion of input wattage, and spectrum. Bibliography.

The Application of the Neon Lamp to the Comparison of Capacities and High Resistances, J. Taylor and W. Clarkson. Jl. Sci. Instruments, vol. 1, no. 6, May 1924, pp. 173-182, 9 figs. Deals with application of "flashing" of neon discharge tube to measurement of capacities and high resistances; extension of method utilizes beats between two neon lamp circuits "flashing" at high frequencies, for measurement of small capacities.

See also RAILWAY SIGNALING, Neon Lamps for.

Quartz-Windowed. An Incandescent Lamp with a Quartz Window, D. C. Stockbarger. Optical Soc. Am.—Jl., vol. 9, no. 3, Sept. 1924, pp. 337-339, 2 figs. Describes a lamp giving a continuous ultraviolet light, similar to Gehlhoff lamp except in construction of side tube. Side tube, 5/8 in. inside diameter by about 6 in. long, is graded lime glass-to-quartz joint on end of which is sealed a ground and polished plane fused quartz window.

Railway. SSW Electric Incandescent Lamps in Railway Operation (Die Verwendung von elektrischen Glühlichtleuchten der SSW im Eisenbahnbetrieb), F. Hein. Siemens Zeit., vol. 4, no. 11-12, Nov.-Dec. 1924, pp. 451-457, 7 figs. Discusses types of lamps used for lighting tracks of shunting stations, platforms, station walls, locomotive sheds, workshops, offices, etc.

Russian. The Qualities of the Russian Electric Lamps, I. M. Russak. Elektritchestvo, no. 5, May 1924, pp. 256-265, 11 figs. Data of tests. It is claimed that Russian lamps are not inferior to Osram lamps. (In Russian.)

Specifications. Problems in Illumination (Problemi di illuminazione), C. Clerici. Elettrotecnica, vol. 11, no. 23-24, Aug. 15-25, 1924, pp. 553-558. Discusses choice of lamps, calibration, specifications for tungsten-filament lamps, testing, etc.

Statistics on Use. Statistics on Use of Incandescent Lamps. Elec. News, vol. 33, no. 12, June 15, 1924, pp. 53-54, 2 figs. Gives demand by sizes, lamp-price changes, and recent developments.

Tungsten-Filament. The Development of the Electric Incandescent Lamp, B. P. Dudding and C. J. Smithells. World Power, vol. 1, no. 2, Feb. 1924, pp. 106-110, 9 figs. The tungsten filament.

The Testing of Tungsten Incandescent Lamps under Given Conditions (Ueber die Prüfung von Wolfram-Glühlampen unter definierten Bedingungen), F. K. v. Göler. Licht u. Lampe, no. 2, Jan. 17, 1922, pp. 28-30, 3 figs. Behavior of tungsten lamps when burning with different specific charges; evaluation of duration test results and practical utilization of tests.

Variation of Temperature and Brightness of a Tungsten Filament Rendered Incandescent by Alternating Current (Variazioni di temperature e di splendore di un filamento di tungsteno reso incandescente da corrente alternata), A. Mendici. Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 677-678, 2 figs. Results of tests by means of photometric measurement deducing temperature variation from variation in brightness.

Variations in Temperature and Electron Emission of a Tungsten Filament Rendered Incandescent by Alternating Current (Variazioni di temperatura e di emissione elettronica di un filamento di tungsteno reso incandescente da corrente alternata), M. Paris. Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 673-677, 10 figs. Experiments to establish amplitudes and limits of temperature variations of a tungsten filament raised to high temperature by an electric current in vacuum.

See also Specifications.

ELECTRIC LOCOMOTIVES

Austria. Electric Passenger- and Express-Train Locomotives, Type 1CI, Series 1029, of the Austrian Federated Railways (Elektrische Personen- und Schnellzugslokomotiven Bauart 1CI, Reihe 1029 der österr. Bundesbahnen), R. Meixner. Elektrotechnik u. Maschinenbau, vol. 42, no. 36, Sept. 7, 1924, pp. 541-549, 5 figs. Details of design, electric and mechanical equipment.

Baldwin-Westinghouse. Baldwin-Westinghouse Electric Locomotives in South America and Japan, H. R. Barnes. Baldwin Locomotives, vol. 2, no. 3, Jan. 1924, pp. 3-18, 26 figs. Describes types employed in Chile, Argentina, and Japan.

Current-Generating System. Railway Electrification (Considerations sur l'électrification des chemins de fer), E. Stassano. Génie Civil, vol. 84, no. 20, May 17, 1924, pp. 472-475. Notes on Stassano system of generation of current on locomotive. Supplementary note is appended on observations on Stassano system of traction, setting forth its shortcomings.

Design. Design of Electric Locomotives (Gestaltung elektrischer Lokomotiven), W. Reichel. Siemens Zeit., vol. 4, no. 11-12, Nov.-Dec. 1924, pp. 381-401, 31 figs. Design and development of principal type of locomotives for German and other railways, including 1C+C1, 1CC1, 1BB1, 1C2, 2BB2, A3+A3, $2A_12$.

Developments. Development of the Electric Locomotive, F. H. Shepard. Ry. Age (Daily Edition), vol. 76, no. 32, June 14, 1924, pp. 1568-1579, 17 figs. History of development, with tabulation of practically every electric locomotive in world, built or under construction, showing wheel and cab arrangement of each type in diagram; advantages and disadvantages of each type of drive.

Recent Developments in Electric Locomotives, N. W. Storer. Mech. Eng., vol. 46, nos. 9 and 11, Sept. and Nov. 1924, pp. 523-528, and (discussion) 686-688, 9 figs. Describes some of the recent designs of electric locomotives and discusses some of the tendencies in design, especially of mechanical parts.

The Development of the Electric Locomotive, A. H. Armstrong. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 608-617, 18 figs. General comparison of steam and electric locomotives; forms of motor drive; electric-locomotive rating; otheograph tests of locomotive impact on rails, etc.

The Development of the Electric Locomotive, F. H. Shepard. Ry. Elec. Engr., vol. 15, no. 7, July 1924, pp. 225-236, 1 fig.

Diesel-Electric. See LOCOMOTIVES, Diesel-Electric.

Dimensioning and Efficiency. Connection between Dimensioning of Motors, Gear Arrangement and Maximum Efficiency in Single-Phase Locomotives (Untersuchung der Zusammenhänge über Motordimensionierung, Getriebeanordnung und Grenzleistung bei Einphasenvollbahnlokomotiven), E. Wist. Elektrotechnik u. Maschinenbau, vol. 42, no. 30, July 27, 1924, pp. 465-468, 1 fig. Abstract of dissertation.

Direct-Current. Electric Locomotives for the Detroit & Ironton, F. Allison, H. L. Maher and L. J. Hibbard. Ry. Age, vol. 77, no. 16, Oct. 18, 1924, pp. 685-686, 1 fig. See also Ry. Rev., vol. 75, no. 16, Oct. 18, 1924, pp. 578-580, 1 fig. D. c. driving motors will receive power from 22,000-volt a.c. trolley.

Electrical Engineering Exhibits—The British Empire Exhibition. Engineer, vol. 138, no. 3588, Oct. 3, 1924, pp. 370-374, 17 figs. partly on p. 382. Describes d.c. locomotives exhibited by Metropolitan-Vickers Elec. Co., and controlling equipment for 1500-hp. 3300-volt. a.c. winder exhibited by Allen West & Co.; other exhibits.

New High-Speed Electric Locomotives, Type 1-3-1, for 650-Volt Direct Current (Nuove locomotive elettriche 1-3-1 a grande velocità a corrente continua 650 Volta), A. Giaquinto. Rivista Tecnica delle Ferrovie Italiane, vol. 26, no. 3, Sept. 15, 1924, pp. 53-61, 13 figs. partly on supp. plates. Design, construction, and equipment of five locomotives built by Officine Mecaniche di Milano for Milano-Varese line; two 800-hp. motors; total weight, 67 tons.

Dynamometer Cars. Measurement Car for the Investigation of Electric Locomotives (Der Messwagen zur Untersuchung elektrischer Lokomotiven), Kleinow. Glasers Annalen, vol. 94, no. 5, Mar. 1, 1924, pp. 53-57, 10 figs. Describes car of the German State Railway fully equipped for investigation of electric locomotives; details of design, measuring instruments, and results.

Tests of Electric Locomotive, Norfolk & Western Ry., T. C. Wurts. Ry. Rev., vol. 75, no. 16, Oct. 18, 1924, pp. 581-583, 1 fig. Dynamometer car used to produce data on actual road performance of new type LC-2 motive power.

1800-Hp. 4-6-6-4-Type. Electric Locomotive for the Imperial Japanese Railways. Engineering, vol. 117, no. 3030, Jan. 25, 1924, pp. 97-100, 11 figs. partly on supp. plate and p. 112. Describes locomotives supplied by English Elec. Co. of 4-6-6-4 type having motor equipments of 1800 hp.

English. "English Electric" Locomotives for Montreal. Tramway & Ry. World, vol. 56, no. 30, Dec. 18, 1924, pp. 322-323, 4 figs. Particulars of electric locomotive built by English Elec. Co. for Montreal Harbor Commissioners; designed with special view to increased traffic movements; box cab double-bogie articulated type, equipped with four 430-hp. motors, each driving through twin spur gearing on to axle; line voltage 2400 d.c.; 0-4-4-0 type.

Equipment, Sweden. Electric Train Operation in Sweden (Elektrische Zugförderung und die Wasserkräfte Schwedens), M. Winkler. Dinglers Polytechnisches Jl., vol. 339, no. 5, Mar. 1924, pp. 37-39, 5 figs. Illustrates and describes equipment of locomotives for electrically operated road across Sweden and Norway over Gellivare.

Freight. Pennsylvania Builds Three Electric Locomotives, T. C. Wurts. Ry. Age, vol. 76, no. 4. Jan. 26, 1924, pp. 295-296, 4 figs. See also Elec. Ry. Jl., vol. 63, no. 4, Jan. 26, 1924, pp. 133-134, 6 figs., and Ry. Rev., vol. 74, no. 4, Jan. 26, 1924, pp. 170-172, 6 figs. Data on three 200-ton locomotives being built at Altoona shops of Pennsylvania; all of same type, but one to be used for freight service under single-phase a.c. trolley, and other two for passenger service on d.c. current.

See also German; Mexican Ry.; 0-4-4-0.

German. Electric Locomotives with Special Reference to the Locomotives of the German State Railways (Die elektrischen Lokomotiven unter besonderer Berücksichtigung der Lokomotiven der Deutschen Reichsbahn), M. Kleinow. Elektrotechnische Zeit. vol. 45, nos. 22 and 23, May 29, and June 5, 1924, pp. 547-553 and 583-588, 16 figs. Discusses a.c. locomotives of 15,000 volts and 16 2/3 periods used for long-distance traffic, their development and construction and equipment.

Heavy Freight Locomotives, Type C-C, of the German State Railways (Die schweren Güterzuglokomotiven Bauart C-C der Deutschen Reichsbahn), O. Michel. Elektro-Journal, vol. 4, no. 9, Sept. 1924, pp. 257-265, 21 figs. Design and construction of new type locomotive for average train loads of 1200 tons; acceleration, 25 km. in 3½ min. on gradients of 10 per cent; maximum velocity, 55 km.; tractive effort, 27,000 kg. for 10 seconds static pull.

The New Electric Locomotives of the German State Railways (Die neuen elektrischen Lokomotiven der Deutschen Reichsbahn), O. Michel. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 177-187, 15 figs. Describes the seven different types adopted by German State Rys.

Industrial. Electric Industrial Locomotives, F. E. Fisher. Iron & Steel Engr., vol. 1, no. 12, Dec. 1924, pp. 628-633, 4 figs. Problems which must be considered in selecting type or design of locomotive.

Japanese. Electric Locomotives for the Imperial Government Railways of Japan. English Elec. Jl., vol. 2, no. 6, Apr. 1924, pp. 294-301, 9 figs. Particulars of the three types ordered, namely, local passenger, freight, and express passenger locomotives. All fitted with same motor, 306 hp., 750 volts.

Maintenance. Economy of Electric Railway Operation as Influenced by the Maintenance of the Locomotives and by the Provision of Suitable Repair Shops (Die Wirtschaftlichkeit der elektrischen Zugförderung in Abhängigkeit von der Unterhaltung der Lokomotiven und vom Bau und Betrieb grösserer Ausbesserungswerke für elektrische Lokomotiven), Sorger. Glasers Annalen, vol. 95, nos. 6 and 7, Sept. 15 and Oct. 1, 1924, pp. 90-98 and 159-170, 10 figs. Compilation of data from operation of electric railways in various countries; comparison of maintenance and operation expenses of steam and electric locomotives; plans and diagrams of construction and operation of electric-locomotive repair shops.

Mexican Railway. Passenger and Freight Locomotives for Mexican Railway Company, Ltd., G. H. Walker. Gen. Elec. Rev., vol. 27, no. 4, Apr. 1924, pp. 272-277, 9 figs. Mechanical and electrical details of 150-ton 3000-volt d.c. locomotive; tractive effort, 54,000 lb. speed at 1 hr. rating, 19 m.p.h.; how locomotives have been arranged to meet service requirements of this particular electrification.

Midi Railway, France. High-Speed Electric Traction (La traction électrique à grande vitesse), F. Broussouse. Technique Moderne, vol. 16, no. 9, May 1, 1924, pp. 324-328, 5 figs. New locomotives with vertical motors of the Midi Railway.

High-Speed Locomotives, Type 2-C-2, of the Midi Railway (Les locomotives à grande vitesse type 2 C 2 de la Compagnie des Chemins de fer du Midi), B. Leboucher. Société Française des Electriciens—Bul., vol. 4, no. 36, June 1924, pp. 437-462, 17 figs. Discusses stability, classification, design, characteristics, and mechanical and electric equipment of 2-C-2 Midi locomotives and of 2-D-2 type recently ordered.

Motor-Generator. Motor-Generator Locomotives for the New Haven. Ry. Age, vol. 77, no. 16, Oct. 18, 1924, pp 697-698, 2 figs. Alternating current from trolley converted to direct current for motors on locomotive.

Mountain Express. A Mountain Express Engine, B. Vannes. Electrician, vol. 93, no. 2421, Oct. 10, 1924, pp. 407 and 412, 1 fig. Design employed on Austrian State railways; first electric mountain express locomotive. Translated from Elektrotechnik u. Maschinenbau.

0-4-4-0 Type. Electric Goods Locomotive, Victorian Government Railways. Ry. Gaz., vol. 40, no. 17, Apr. 25, 1924, pp. 596-597, 3 figs. Particulars of two locomotives to be used for service in Melbourne metropolitan railway yards and for hauling freight trains within Melbourne suburban electrified railway area; wheel arrangement 0-4-4-0; voltage and system 1500 d.c., individual single-geared drive, maximum tractive effort 26,000 lb.

Norfolk & West. Ry. New Electric Locomotives of the N. & W. Ry., T. C. Wurts. Ry. Rev., vol.

74, no. 23, June 7, 1924, pp. 1018-1022, 9 figs. Equipment just put in service illustrates advances of 30 years' experience in electric motive power.

Oil-Engine-Driven. Oil-Engine-Driven Electric Shunting Locomotive. Engineering, vol. 118, no. 3075, Dec. 5, 1924, p. 781, 3 figs. Built jointly by Gen. Elec. Co. and Ingersoll-Rand Co. for switching service; it is equipped with 300-hp. oil engine directly connected to 200-kw. generator.

See also LOCOMOTIVES, Diesel-Electric.

Parallel-Crank Drive. Vibrations of Electric Locomotives with Crank Drive (Die Schüttelschwingungen elektrischer Lokomotiven mit Stangenantrieb), A. Winkler. Elektrotechnik u. Maschinenbau, vol. 42, nos. 16 and 17, Apr. 20 and 27, 1924, pp. 241-248 and 261-265, 7 figs. Problem of parallel-crank drive and its history; ideal parallel-crank drive; forced oscillations of practical parallel-crank drive; elasticity of shafts; play of bearings; quasi- and pseudo-harmonic oscillations; gear springs; damping of systems with rigid speed characteristics; subsequent calculation of actual locomotives with special consideration of gear springs and damping.

Paris-Orleans Ry., France. High Speed Passenger Locomotive for Paris-Orleans Railway, W. D. Bearce. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 146-150, 3 figs. Detailed description of gearless 120-ton locomotive; nominal voltage of system 1500 volts d.c.

Passenger. Electric Passenger Train Locomotive for the Railway Line Görlitz—Königsberg, Paul Müller. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 173-174, 4 figs. Approved 2Dl locomotive with rod drive, for heavy gradients. Supplied by Bergmann Elec. Works, Berlin.

Pit and Quarry Haulage. Locomotives for Haulage at Pits and Quarries, H. H. Johnston. Pit and Quarry, vol. 8, no. 7, Apr. 1924, pp. 97-100, 4 figs. Notes on different types of electric locomotives, and electric equipment for haulage systems.

Quencher, for Coke Plants. Electric Quencher Locomotives for By-Product Coke Plants, H. H. Johnston. Elec. Jl., vol. 21, no. 11, Nov. 1924, pp. 517-520, 4 figs. Operation and maintenance of electric locomotives in quenching service; types; pneumatically operated automatic control.

Regenerative. New Locomotives for the Norte Railways of Spain, W. R. Taliaferro. Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, pp. 364-365, 1 fig. 3000-volt d.c. regenerative locomotives built by Westinghouse Elec. Mfg. Co. and Baldwin Locomotive Works.

Side Rods. Oblique Articulated Side Rods for Electric Locomotives, G. Darrieus. Brown Boveri Rev., vol. 11, no. 3, Mar. 1924, pp. 43-51, 9 figs. Describes statically determinate transmission system and its characteristics; successful experiments with oblique articulated rods up to highest speeds.

Siemens-Schuckert. The Siemens-Schuckert Locomotives on the Swedish Riksgränsbahn (Die Siemens-Schuckert-Lokomotiven auf der schwedischen Riksgränsbahn), F. Kuntze. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 4, Jan. 26, 1924, pp. 72-76, 21 figs. Brief outline of first 1C + C1 locomotives of Swedish railway and results obtained therewith; description of new 1C + C1 locomotives and their ability to meet stringent requirements made on them.

See also Swedish Railways.

Single-Phase. New Type Electric Locomotives for New York, New Haven & Hartford R. R. Ry. Rev., vol. 75, no. 17, Oct. 25, 1924, pp. 623-624. Details of single-phase locomotives which do not have a.c. traction motors; each locomotive contains traveling substation and will be equipped with synchronous motor-generator set for converting 11,000-volt, 25 cycle single-phase supply to direct current.

1-C-1 Electric Locomotives of the Swiss Federal Railway (Les locomotives électriques type 1-C-1 des Chemins de fer fédéraux), E. Savary. Bul. Technique de la Suisse Romande, vol. 5, no. 3, Feb. 1924, pp. 25-29, 9 figs. partly on supp. plate. Principal features and advantages of single-phase locomotives with individual axle drive, built by Sécheron Works, Geneva. Translation in Int. Ry. Congress Assn.—Bul., vol. 6, no. 6, June 1924, pp. 457-461, 4 figs.

Single-phase Electric Locomotives. Engineer, vol. 137, no. 3560, Mar. 21, 1924, pp. 305-308, 23 figs. partly on p. 310 and supp. plate. Describes 1 B-B 1 and 1-C-1 locomotives built by Sécheron Co., Geneva, for Swiss railways.

2-C-1 Single-Phase Electric Locomotive with Individual Drive. Engineer, vol. 137, no. 3562, Apr. 4, 1924, p. 369-371, 6 figs. partly on p. 362. New locomotives built by Brown, Boveri & Co., in which each driving axle has an independent motor; gearing is fitted on one side of engine and driving wheels on opposite side are free.

See also 2-8-2.

South African Railways. Electric Locomotives for South African Government Railways. Tramway & Ry. Wld., vol. 55, no. 30, June 19, 1924, pp. 285-290, 10 figs. Describes locomotives on main-line railway of Glencoe and Pietermaritzburg section of So. African Rys. which deal chiefly with hauling of heavy mineral traffic down to coast; A.A. + A.A. type; gage, 3 ft. 6 in.; equipped with four 300-hp. motors; weight, 66 tons 12 cwt.; overall length, 48 ft. 8½ in.; tractive effort, maximum, 40,000 lb.

Electric Locomotives for South African Railway. Ry. Age, vol. 77, no. 2, July 12, 1924, pp. 53-56, 6 figs. Description of combined passenger and freight locomotives for Glencoe to Pietermaritzburg section.

3,000-Volt Locomotives for South African Railway. Elec. Ry. Jl., vol. 64, no. 11, Sept. 13, 1924, pp. 390-391, 3 figs. Describes locomotives designed for use on narrow-gage line, three 75-ton units being coupled together to haul a 1430-ton freight train.

Storage-Battery. Storage-Battery Locomotives and Their Use for Railways (Die Akkumulatorlokomotive und ihre Verwendung für Eisenbahnen), R. Winckler. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 14, Oct. 30, 1924, pp. 325-328, 4 figs. Types of locomotives, advantages of storage-battery drive, application in shunting yards, auxiliaries in freight traffic, freight trains for narrow-gage lines, and light passenger traffic on main lines.

See also Switching.

Swedish Railways. The Siemens-Schuckert-Locomotives of the Swedish State Railways (Riksgränsbahn), F. Kuntze. Eng. Progress, vol. 5, no. 1, Jan. 1924, pp. 1-4, 6 figs. Details of ore-train twin locomotives of 1C + C1 type.

Swiss. Electric Locomotives of the Swiss Federal Railways (Die elektrischen Lokomotiven der S.B.B.), M. Weiss. Schweizerische Bauzeitung, vol. 84, no. 2, July 12, 1924, pp. 21-24. Discusses results of locomotive operation, advantages of electric traction so far shown; interruptions and damages to locomotives; cost of maintenance.

See also Single-Phase.

Switching. Electric Switchers for Paulista Railway, W. D. Bearce. Elec. Traction, vol. 20, no. 5, May 1924, pp. 214-215, 2 figs. Steeple cab-type electric switching locomotives used on railway in Brazil; running gear consists of two swivel trucks each equipped with two GE-255-1500/3000 volt motors.

High-Power Battery Locomotives for Shunting Purposes, M. Hiertzeler. Brown Boveri Rev., vol. 11, no. 10, Oct. 1924, pp. 215-219, 6 figs. Battery locomotive, class E 421, supplied to Italian State Railways; battery locomotives for Swiss Federal Railways.

See also Oil-Engine-Driven.

Tests. Epoch Making Tests on New Passenger and Freight Locomotives, W. D. Bearce. Gen. Elec. Rev., vol. 27, no. 2, Feb. 1924, pp. 98-103, 9 figs. Describes tests carried out at Erie Works of Gen. Elec. Co. on two electric locomotives, viz., Paris-Orleans passenger, and freight locomotive for Mexican Ry. Co.; principal features of locomotives.

Three-Phase. New Three-Phase Electric Locomotives of the Italian State Railways (I nuovi locomotori elettrici trifasi a 5 sale accoppiate delle FF.SS.), Amedeo Savoia. Rivista tecnica delle Ferrovie Italiane, vol. 25, no. 4, April 15, 1924, pp. 128-134, 1 fig. Details of new three-phase locomotive with five coupled axles (type Gr. E 551).

Turbo-Electric. See LOCOMOTIVES, Turbo-Electric.

2-8-2. The Pennsylvania 2-8-2 Type Electric Locomotive, W. H. Enunson. Railroad Herald, vol. 28, no. 8, July 1924, pp. 34a-34c, 3 figs. Also Ry. & Loco. Eng., vol. 37, no. 6, June 1924, pp. 173-175, 3 figs. New single-phase electric locomotives for use in either freight or passenger service on 11,000-volt 25-cycle alternating current, built and designed by Penn. Ry.

Vibrations. The Vibrations on Electric Locomotives with Crank Drive (Die Schüttelerscheinungen elektrischer Lokomotiven mit Kurbelantrieb), Iwan Döry. Elektrotechnik u. Maschinenbau, vol. 42, no. 4, Jan. 27, 1924, pp. 45-47, 3 figs. Discusses causes of periodic vibration and indicates that play in bearings is largely responsible for it; fact that vibrations occur under no load as well as at full load tends to support author's conclusions; use of properly placed springs in gear mechanism is means for avoiding vibrating and resonating phenomena.

Westinghouse-Baldwin-Naval. Electric Locomotives for the Spanish Northern. Ry. Age, vol. 77, no. 23, Dec. 6, 1924, pp. 1037-1038, 1 fig. Westinghouse-Baldwin-Naval locomotives are of 6-axle type with 6-wheel swivel trucks. See also description by W. R. Taliaferro in Ry. Rev., vol. 75, no. 23, Dec. 6, 1924, pp. 912-915, 7 figs.

ELECTRIC MEASURING INSTRUMENTS

A. C. Compensators. A New A. C. Compensator (Ein neuer Wechselstromkompensator), W. Geyger. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 80-82, 2 figs. Describes simple compensator which permits direct reading of amplitude and phase of alternating current as well as its actual and apparent components.

Alternating-Current Measurement. New Devices for Measuring Alternating Current in Long-Distance Lines (Neuere Geräte für Wechselstrommessungen an Fernsprechleitungen), P. Kaspareck. Zeit. für Fernmeldetechnik, Werk- u. Gerätebau, vol. 5, nos. 8 and 9, Aug. 16 and Sept. 16, 1924, pp. 62-71 and 85-87, 48 figs. Discusses measuring apparatus meeting increased requirements of telephone cables, including instruments for measuring a.c. sources, controlling manufacture, measurement during laying of cables, and testing quality of telephones or for acceptance tests, made by Siemens & Halske A. G.

Ammeters. See AMMETERS.

Commercial and Indicating. Electrical Measuring Instruments. World Power, vol. 2, no. 11, Nov. 1924, pp. 292-295. Commercial and indicating instruments. Review of book by C. V. Drysdale.

Electromagnetic Direction Moment. Electric Measuring Instruments for Alternating Current with Electromagnetic Directing Moment (Ueber elektrische Messinstrumente für Wechselstrom mit elektromagnetischem Richtmoment), H. Kafka. Elektrotechnik u. Maschinenbau, vol. 42, no. 1, Jan. 6, 1924, pp. 1-5, 6 figs. Study of workings of such instruments; details of double-coil instruments now being used on recommendation of author by Siemens & Halske as indicating instruments for a.c. bridges.

Electrometers. See ELECTROMETERS.

Galvanometers. See GALVANOMETERS.

Hot-Wire. Heat Compensation for Hot-Wire Instruments (Hitzdraht-Messgeräte mit neuartiger Präzisions-Temperaturkompensation), A. Steinert. Elektrotechnische Zeit., vol. 45, no. 16, Apr. 17, 1924, pp. 365-366, 7 figs. To provide precision heat compensation for hot-wire voltmeters and ammeters, one end of platinum-silver hot wire is fastened directly to brass base of instrument, while its other end is held on free end of strip of bi-metallic metal, by proper choice of this thermostatic strip and careful adjustment between it and initial tension in hot wire, very accurate heat compensation may be obtained within plus or minus 10 deg. cent. variations of room temperature; instrument is patented by Velmag Co., Leipzig, Germany.

Magnetometer. A Portable Magnetometer, J. H. Shaxby. Jl. of Sci. Instruments, vol. 1, no. 8, May 1924, pp. 234-237, 2 figs. Describes magnetometer of commutated inductor type, designed primarily for field work, especially in mountainous or otherwise difficult country.

Moving-Coil. Moving-Coil Measuring Instruments (Les appareils destinés à mesurer le rapport de deux couples électrodynamiques), S. Held. Revue Générale de l'Electricité, vol. 15, no. 14, Apr. 5, 1924, pp. 591-598, 9 figs. Novel series of instruments are theoretically explained and shown in sketches; they are based on principle of having either one moving coil within tripolar magnetic field or two angularly displaced moving coils in bipolar field; in this way it is possible to design ohmmeters, phase meters, and frequency meters that are very sensitive and accurate; examples as built by French concern.

Permeameters. Permeameter for Alternating Current Measurements at Small Magnetizing Forces, G. A. Kelsall. Jl. Optical Soc. Am. & Rev. of Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 329-338, 7 figs. Describes apparatus and methods for measuring permeability of a magnetic material to small alternating magnetizing forces.

Repairing. Repair of Electrical Indicating Instruments, V. H. Todd. Ry. Elec. Engr., vol. 15, no. 2, Feb. 1924, pp. 40-42, 1 fig. Causes which may make them indicate incorrectly and remedies which may be applied.

Standard Cells. See BATTERIES, Weston Standard Cells.

Synchronoscope. New Measuring Apparatus for Measuring Quotients (Neues Messwerk für Quotientenmesser), E. Kühnel. Elektrotechnische Zeit., vol. 45, no. 38, Sept. 18, 1924, pp. 1002-1003, 8 figs. New apparatus based on action of fixed coils on an armature consisting of two z-shaped iron vanes; measures also phase and frequency.

Totalizing and Remote Power Indication. The Totalizing and Remote Indication of Electric Power and Its Reactive Component, H. K. Nock and H. S. Edgerly. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 758-761, 10 figs. Describes instrument designed to indicate either

power or reactive component, depending upon its connections; it can be arranged to record graphically in either case output of several generators.

Voltage Surges. The Klydonograph, J. F. Peters. Elec. Wld., vol. 83, no. 16, Apr. 19, 1924, pp. 769-773, 26 figs. Instrument for accurately measuring and recording voltage surges; tests on which calibration is based; photographic plate figures give detailed information of surge characteristics.

Voltmeters. See VOLTMETERS.

Watt-Hour Meters. See WATT-HOUR METERS.

Zero Instruments. Regulator of Sensitiveness of a Zero Instrument (Ein Empfindlichkeitsregler für Nullinstrumente), H. Schering and G. Reichardt. Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt, vol. 7, no. 2, 1924, pp. 241-245, 2 figs. Discusses measurement of a.c. bridges in which it is desirable at first to reduce sensitiveness of zero instrument (vibration galvanometer) and then to increase it gradually to a maximum.

ELECTRIC METERS

Ampere-Hour. Sangamo Types NCR and NCI Amperehour Meters. Ry. Elec. Engr., vol. 15, no. 11, Nov. 1924, pp. 401-402, 3 figs. Describes indicating and regulating meters of improved type.

Argentine Republic. Rules for Certification and Operation of Electric Meters (Prescripciones para la aprobacion y funcionamiento de contadores eléctricos). Boletin de la Asociación Argentina de Electrotécnicos, vol. 10, no. 3-4, Mar.-Apr., 1924, pp. 44-52. Rules by Meter Sub-Committee of Argentine Electrotechnic Assn., covering conditions of certification, testing, coefficient of correction.

Electrolytic. Electrolytic Meter (Elektrolytzähler für Gleichstrom, hergestellt von den Siemens-Schuckertwerken, Nürnberg). Elektrotechnische Zeit., vol. 45, no. 1, Jan. 3, 1924, p. 10, 3 figs. Electrochemical meter which measures amount of consumed energy by amount of hydrogen gas developed on rare-metal cathode by shunted fraction of metered direct current; made by Siemens-Schuckert Works for capacities of 2½ to 10 amperes and circuits of 110 or 220 volts.

Frictional Couples. A Study of Electric Meters (Contribution à l'étude des compteurs d'électricité), R. M. Fichter. Revue Générale de l'Electricité, vol. 8, nos. 23, 24, and 25, June 7, 14, and 21, 1924, pp. 1035-1043, 1083-1095, and 1131-1141, 11 figs. Complete study, based on results of numerous experiments, of nature of frictional couples occurring in all types of electric meters, means of reducing these couples and producing meters of great practical reliability while utilizing only small driving couple; methods of determining frictional couples and also driving couple of meter; study of effects of air friction and influence of shape of brake magnet thereon, action of gearing driving indicating dials, and frictional couples due to brushes in d.c. watt-hour meters; results of tests on commercial meters of various types; author concludes that meters with high driving torque are not always most sensitive.

Induction. Angular Error in Induction Meters (Der Winkelfehler bei Induktionszählern), H. Schering and R. Schmidt. Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt, vol. 7, no. 2, 1924, pp. 225-240, 25 figs. Also Archiv für Elektrotechnik, no. 12, no. 6-12, Feb. 29, 1924, pp. 511-526, 25 figs. Methods for determining deviation of phase displacement in flow of current and voltage; shows that angle of flow of voltage changes considerably with strength of current in coil, angle of current flow changing little.

Electric Meters with Reduced Energy Loss (Les compteurs d'électricité à consommation réduite), M.-R. Fichter, Revue Générale d'Electricité, vol. 15, no. 2, Jan. 12, 1924, pp. 62-65, 6 figs. Describes induction meter of caliber of 10 amperes, 110 volts, 50 periods per sec., and advantages which it offers; meter, which is known as F. B. F., has been approved by French Ministry of Pub. Works.

Kilovolt-Ampere. A New Electricity Meter. Engineer, vol. 137, no. 3567, May 9, 1924, pp. 519-520, 7 figs. A.c. meter which gives direct reading of power factor, total kilowatt-hours, kilovolt-ampere hours, and kilowatt and kilovolt-ampere demand for any predetermined period, and also power factor for over any period; introduced by Westinghouse Elec. & Mfg. Co.

A Universal Meter for Electric Power, B. H. Smith. Elec. Jl., vol. 21, no. 3, Mar. 1924, pp. 112-114, 15 figs. Also Sibley Jl. of Eng., vol. 38, no. 5, May 1924, pp. 120-123, 14 figs. Describes ball type of kv.-a. meter; gives direct reading of indicated power factor, total kw-hr., total kv.-a. hours, and kw. and kv.-a. demand for any time interval; makes use of vector addition of watt-hr. and reactive volt-ampere-hours.

Ball Type of Kva. Meter, B. H. Smith. Elec. Wld., vol. 83, no. 7, Feb. 16, 1924, pp. 333-334, 6 figs. New mechanical arrangement for getting root-mean-square of watt and wattless components to obtain kva. demand.

Recent Developments in Kilovolt-Ampere Metering, B. H. Smith and A. R. Rutter. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 441-445, 18 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1176-1178. Two late developments in kva. demand meters; one is of indicating type and indicates total kw-hr., kw. demand, and kva. demand; other is of recording type and gives record of kw. demand, kva. demand, kw-hr. and kva. hr.

Long-Distance Methods. Automatic Transmission of Power Readings, B. H. Smith and B. T. Pierce. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 101-105, 17 figs. Automatic methods which may be employed for remote metering, including frequency, inverse current, potentiometer, position, voltage, current, and impulse.

Mechanical Constants Measurement. On the Generation of an Extra-Low-Frequency E. M. F., and the Measurements of Mechanical Constants of Electrical Meters, Y. Watanabe. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 424, Nov. 1923, pp. 876-892, 22 figs. Application of extra-low-frequency e.m.f. to determination of mechanical constants of electrical measuring instruments; results given for instruments of moving coil type, moving iron type, electrodynamometer type, and hot-wire type; hysteresis phenomena are observed for instruments of permanent magnet type, and jumping phenomena for those with very small bluntness. (In Japanese).

Power Metering. Remote Metering by the Impulse and Condenser Method, B. H. Smith. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 355-357, 8 figs. Discusses impulse method of transmitting power readings based on converting impulse rates into readable values; advantages.

Reactive Current. Measuring Reactive Current in Three-Phase Systems (Blindverbrauchsmessung in Drehstromnetzen), A. Sengel. Elektrotechnische Zeit., vol. 45, no. 37, Sept. 11, 1924, pp. 973-975, 15 figs. Details of new connections for measuring reactive current by means of wattmeter or kw-hr. counters in three-phase lines under any load.

Recording (Graphic) Frequency. A New Graphic Recording Frequency Meter. World Power, vol. 2, no. 9, Sept. 1924, pp. 182-183, 3 figs. Details of new Nalder-Lipman meter.

Service Fundamentals. Fundamentals of Meter Service, R. C. Fryer and J. Gregory. Elec. Wld., vol. 83, no. 20, May 17, 1924, pp. 1003-1006, 6 figs. Requirements for meter-service boxes; proposes circuit breakers instead of fuses, with meter included in same box.

Service Fuses vs. Circuit Breakers. Service Fuses Versus Circuit Breakers, G. E. Palmer. Elec. Wld., vol. 83, no. 24, June 14, 1924, pp. 1225-1227, 3 figs. Universal service entrance and meter requirements met by properly designed combination fuse and switch boxes; disadvantage of circuit breakers.

Three-Phase. Behavior of Wrongly Connected Three Phase Supply Meters in High Tension Plants (Das Verhalten falschgeschalteter Drehstromzähler in Hochspannungsanlagen), H. Ziemendorff. Elektrotechnische Zeit., vol. 45, no. 36, Sept. 4, 1924, pp. 952-955, 3 figs. Gives tabulation of mistakes and shows consequences on meter of wrong connection, and how to avoid mistakes.

Meter Connections for Three-Phase Lines (Ueber den Anschluss von Drehstromzählern für beliebig belastete Phasen mit Messwandlern), R. Dehrmann. Elektrischer Betrieb, vol. 22, no. 1, Jan. 10, 1924, pp. 1-4, 20 figs. Explains correct ways of wiring meters and methods for checking up meters already wired, and points out that use of 1000-ampere current transformer for meter in circuit which does not carry more than 400 amperes will give very inaccurate readings; tabulation of 18 characteristic misconnections shows what meters read instead of correct value.

Transmission of Readings. The Transmission of Meter Readings by the Impulse Method, B. H. Smith. Elec. Jl., vol. 21, no. 5, May 1924, pp. 219-221, 5 figs. System recently developed for making use of d.c. impulses controlled by watt-hour meter sender and special receiver.

Types. Control of Current Consumption in Transmission Lines (Le contrôle de la consommation d'énergie électrique dans les réseaux de distribution), W. Janvier. Revue Générale de l'Electricité, vol. 16, nos. 5 and 6, Aug. 2 and 9, 1924, pp. 195-203 and 237-248, 30 figs. Discusses difficulties of meters met with in practice, checking meters; direct current and polyphase meters, meters for three-phase current; measuring transformers by direct and indirect methods, potentiometers, etc.

Watt-Hour, Testing. Testing for Rotation of Watt-hour Meters, F. C. De Weese. Power Plant Eng., vol. 28, no. 8, Apr. 15, 1924, pp. 440-441, 5 figs. Describes methods used in making polyphase meter installations and presents diagrams illustrating various steps in testing meters.

ELECTRIC MOTORS

[See also ELECTRICAL MACHINERY.]

Ampere-Turns for Saturated Teeth. Ampere-Turns for Saturated Teeth, V. Karapetoff. Elec. Wld., vol. 83, no. 24, June 14, 1924, p. 1231, 1 fig. Approximate method of computation which will be found sufficiently accurate for purposes of design.

Armatures. See ARMATURES.

Automatic Control. Electric Motors with Automatic Working Control (Die Anwendung des Arbeitsregler-Antriebes), O. Pollok. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 1 and 2, Jan. 5 and 12, 1924, pp. 6-8 and 29-31, 17 figs. Describes drive for machines with heavily fluctuating power capacity by means of automatically regulated electric motor; applications and advantages of device developed by author and marketed by German Gen. Elec. Co. (AEG).

Auxiliary-Drive, Control of. Control of Auxiliary-Drive Motors, A. L. Harvey. Power, vol. 59, no. 20, May 13, 1924, pp. 761-762, 2 figs. Automatic regulation of motor speed; control of stoker drives; use of two motors for driving forced- and induced-draft fans; automatic change over from one source of power to another.

Ball Bearings for. See BEARINGS, BALL, Motor.

Bearings. See BEARINGS, Motor, Selection of; BEARINGS, ROLLER, Motors.

British Empire Exhibition. The British Empire Exhibition. Machy. (Lond.), vol. 24, no. 609, May 29, 1924, pp. 279-282, 7 figs. Electric motors and control gear.

Brushes. See BRUSHES.

Chemical Plants. Electric Motors for Drive of Small Chemical Plants (Der Elektromotor als Antriebsvorrichtung für den chemisch-technischen Kleinbetrieb), W. Meysahn. Chemiker-Zeitung, vol. 48, no. 113, Sept. 18, 1924, pp. 665-666. Discusses advantages of electric drive generally and especially of individual drive.

Commutation. See COMMUTATION.

Controllers. Brown Boveri Drum Controllers, J. F. Lochhead. Brown Boveri Rev., vol. 11, no. 5, May 1924, pp. 87-97, 21 figs. Design and operation of drum controllers used for low and medium power motors starting up at most 200 times per hr.

Electric Motor Control Systems and Motor and Like Controllers. Abridgments of Specifications (Lond.), Class 38 (ii), 1924, Period 1916-20, 178 pp. Patents for inventions.

Limitations of Manual Controllers for Electric Motors, H. D. James. Power, vol. 59, no. 18, Apr. 29, 1924, pp. 671-672, 2 figs. Advantages and limitations of manual controller compared with magnetic.

Motor Controlling Devices. South. Engr., vol. 41, no. 4, June 1924, pp. 55-59, 17 figs. Notes on use and connections of various forms.

Operation and Care of Cam-Type Manual Controllers for Electric Motors, H. D. James. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 480-481, 4 figs.

Operation and Care of Drum-Type Manual Controllers for Motors, H. D. James. Power, vol. 59, no. 10, Mar. 4, 1924, pp. 368-369, 4 figs. Function of controller parts; adjustment of contact-finger pressure; movement and lift of fingers; inspecting and cleaning; a.c. controllers.

Cotton-Mill. See COTTON MILLS, Electric Motors for.

Design. See ELECTRICAL MACHINERY, Design.

Direct-Coupled Geared. The Moderate-Powered Direct-Coupled Back-Geared Motor, E. G. Ross. Elec. Rev., vol. 95, no. 2450, Nov. 7, 1924, pp. 684-685. Machine consists of a standard-type electric motor running at speed between 800 and 1200 r.p.m., and fitted with simple spur reduction gear to bring down speed to required value on second-motion shaft; this type is said to have many advantages for driving of low-speed shafting.

Direct-Current. See ELECTRIC MOTORS, D. C.

Fans. See FANS, Electrically Driven.

Fractional-Horsepower. Fractional Horse-power Motors. Machy. (Lond.), vol. 25, no. 635, Nov. 27, 1924, pp. 278-279, 6 figs. Describes Wilson-Wolf motors, characteristic feature of which is highly developed degree of standardization, not

only in component parts, but also in methods of framing and equipping motors.

Heating. The Heating of Electric Machines (Die Erwärmung elektrischer Maschinen), F. Ratkovszky. Elektrotechnische Zeit., vol. 45, no. 21, May 22, 1924, pp. 527-528, 1 fig. Method is derived for determination of maximum superheat of electric machines with sufficient accuracy.

Helical Gearing System. The Uggla System of Helical Gearing for Electrical Motors. Commonwealth Engr., vol. 11, no. 5, Dec. 1, 1923, pp. 178-170, 3 figs. Description of system and its advantages.

Installation. How to Handle Electric Motors and Generators. Elec. News, vol. 32, nos. 23 and 24, Dec. 1 and 15, 1923, and vol. 33, nos. 1 and 2, Jan. 1 and 15, 1924, pp. 40-41, 41-42, 40-41 and 42-44, 2 figs. Complete instruction on installation and maintenance.

How to Install Motors and Generators. Coal Industry, vol. 7, no. 6, June 1924, pp. 251-255. Handling, locating, erecting, connections, drives, starting, operation, synchronizing, care, and inspection.

Railway. Back Gear for Street Car Motors (Zur Frage der Zahnradvorgelege von Strassenbahnmotoren), Willenberg. Verkehrstechnik, vol. 41, no. 45, Nov. 7, 1924, pp. 559-563, 9 figs. Discusses drawbacks for present types and suggests improvements. Advantages of Albrecht-Krupp drive.

Effect of Rotation on Stress Distribution in Electric Railway Motor Pinions, A. L. Kimball, Jr. Gen. Elec. Rev., vol. 27, no. 2, Feb. 1924, pp. 130-131, 5 figs. Further results of a study which is being made of stresses in railway motor pinions by Coker photoelastic method.

Methods in a Rapid Transit Shop, F. H. Colvin. Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 889-890, 7 figs. Special devices for handling and cleaning armatures, for pulling pinions, utilizing pneumatic drills as drilling machines, and for putting couplings in air-brake hose.

Shock-Reducing Suspension of Traction Motors Only Partly Mounted on Springs (Stossvermindernde Aufhängung des nur teilweise abgefederten Bahnmotors), A. Laternser. Schweizerische Bauzeitung, vol. 84, no. 11, Sept. 13, 1924, pp. 125-127, 3 figs. Discusses Bentley-Knight suspension and deals with motor suspension from point of view of dynamics.

Stress Distribution in Rotating Gear Pinions as Determined by the Photoelastic Method, P. Heymans and A. L. Kimball, Jr. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 129-130 and (discussion) 130-132 and 171, 6 figs. Further results of scientific study undertaken by Gen. Elec. Co. for development of superior electric-railway motor pinions; continuation of work started and reported upon before A. S. M. E. in preceding year; results from preliminary observations.

Winding Standards for a Railroad Electrical Shop, A. C. Turtle. Ry. Elec. Engr., vol. 15, no. 5, May 1924, pp. 141-143, 4 figs. A course of procedure for repairing and testing coils of various kinds of motor equipment.

Railway, Bearing Lubrication. See BEARINGS, Railway-Motor.

Railway, Lubrication of. See LUBRICATION, Railway Motors.

Repair. See Railway.

Rolling-Mill. See ROLLING MILLS, Electric Motors.

Small, Manufacture of. Routing and Handling Material in Making a Quarter-Horsepower Motor, L. C. Morrow. Am. Mach., vol. 61, no. 8, 9, and 10, Aug. 21, 28, and Sept. 4, 1924, pp. 291-294, 333-336, and 389-392, 18 figs. Straight-line method of manufacture. Economical use of floor space and man-power. Judicious use of conveyors.

Starting Rheostats. See RHEOSTATS, Starting.

Starting Torque. The Determination of Starting Torque for Motor Drives, P. B. Jackson. Power, vol. 60, no. 14, Sept. 30, 1924, pp. 527-528, 3 figs. Discusses a method for determining starting torque of a load. Contains table giving approximate starting characteristics of a.c. and d.c. motors.

Totally Enclosed. "Emcol" Totally Enclosed Motors. Machy. (Lond.), vol. 24, no. 601, Apr. 3, 1924, pp. 4-5, 2 figs. Production of motors on interchangeable basis; improved method of cooling in Emcol system; duplex system of air ducts.

Variable-Speed Transmissions. Practical Pointers on How Variable Speeds Can Be Obtained, Indus. Engr., vol. 82, no. 11, Nov. 1924, pp. 519-524 and 555, 19 figs. Describes types of equipment used for adjusting speeds to needs of a process or to work performed by machines singly or in a group.

Wood and Metalworking Machinery. Wood and Metal-Working Machinery Motor Requirements, H. C. Jorstad. Elec. World, vol. 83, no. 11, Mar. 15, 1924, pp. 519-521, 4 figs. Applications of former require high-speed drive; variable and adjustable speed requirements must be met on lathe applications; trend in development.

ELECTRIC MOTORS, A. C.

Air-Compressor Drive. See AIR COMPRESSORS, Electric Motors for.

Circle Diagrams. See Induction.

Commutator. Brush Shifting Polyphase Commutator Motor, G. Fox. So. Engr., vol. 41, no. 5, July 1924, pp. 55-59, 8 figs. Describes design of motor used to some extent in power plant, especially for fan and dump devices.

Commutation Characteristics of Single-Phase Commutator Motors (Die Kommutierungscharakteristiken des Einphasenkollektormotors), K. Krauss. Elektrotechnische Zeit., vol. 45, no. 33, Aug. 14, 1924, pp. 876-878, 2 figs. Deals with polar curves for reversing field and reversing pole vectors for variable operation and their use.

Commutator Motor for Demonstration Purposes (Kollektormotor für Demonstrationszwecke), J. Hassdenteufel. Elektrotechnik u. Maschinenbau, vol. 42, no. 39, Sept. 28, 1924, pp. 581-582, 8 figs. Design and construction of a motor used for educational purposes, characteristics of operation corresponding to different types of machines according to connections made.

New Polyphase Commutator Motor with Commutating Field and Phase Compensation (Moteur polyphasé à collecteur à champ tournant avec champ de commutation), A. Heyland. Revue Générale de l'Electricité, vol. 16, no. 16, Oct. 18, 1924, pp. 619-630, 17 figs. Main feature of this motor to which it owes its remarkable characteristics is arrangement of stator winding, rotor winding being of standard type; use of hexaxial and triaxial types of winding; owing to excellent commutation, size of commutator in new type of motor does not exceed that which would be used in standard d.c. motor.

Variable Speed A. C. Commutator Motors, H. Dreghorn. Electricity, vol. 38, nos. 1753, 1754, 1755, and 1756, June 13, 20, 27, and July 4, 1924, pp. 303-304; 318; 333-334; and 345-346. Series commutator motor; Eichberg 3-phase shunt commutator motor; Schrage variable-speed motor; etc.

Compensating. The Use of a Synchronous Compensator for Modification of Power Factor of a Plant Purchasing Electric Power (Considérations sur l'emploi d'un compensateur synchrome pour modifier le facteur de puissance d'une usine consommatrice d'énergie électrique), A. E. Bellan. Revue Générale de l'Electricité, vol. 15, no. 15, Apr. 12, 1924, pp. 645-655, 7 figs. Author seeks to show that considerable economy can be realized by an industrial consumer, with aid of a synchronous compensator with or without automatic control, supplying all or part of reactive energy consumed.

Concatenation, Parallel. Parallel Concatenation of Induction Motors. T. Isono. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 431, June 1924, pp. 517-544, 16 figs. Explains characteristics of parallel concatenation which can be obtained by changing some connections of series concatenation and easily started with one of the two induction motors with smaller number of poles. (In Japanese.)

Control Gear, Air-Break. Air-Break Control Gear for Small A. C. Motors. Electricity, vol. 38, nos. 1744, 1745, and 1746, Apr. 11, 18, and 25, 1924, pp. 185-186, 198-199, and 209-210, 3 figs. Breaker versus fuse; air-break versus oil-break; switching "direct on"; describes typical totally-enclosed air-break "Mill" circuit breaker; limiting starting current; control of slip-ring induction motors.

Controllers. See ELECTRIC MOTORS Controllers.

Crawling. Crawling of Three-Phase Squirrel-Cage Induction Motors, T. F. Wall. World Power, vol. 1, no. 4, Apr. 1924, pp. 224-233, 7 figs. Discusses phenomenon of crawling, i.e., running up of motor to some speed which is only fraction of normal synchronous speed and remaining running at that low speed; cause and remedies.

Excitation. The Excitation of Synchronous Machines, R. G. Jakeman. Elec. Rev., vol. 94, no. 2410, Feb. 1, 1924, pp. 167-168, 7 figs. Use of distributed exciting windings and uniformly slotted exciting members.

Fynn-Weichsel. Induction and Synchronous Features in New Motor. Coal Age, vol. 25, no. 4, Jan. 24, 1924, pp. 141-142, 2 figs. Describes Fynn-Weichsel motor, developed by Wagner Elec. Corpn. of St. Louis, Mo., embodying best characteristics of both types; combines high efficiency, high torque, constant speed, and high power factor.

Grounds, Locating. Locating Grounds on Motor Circuits, A. Haist. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 655-656, 1 fig. In writer's experience one of best methods for locating grounds on any of various motors on 3-phase system is by means of radial switch having contact point for each phase and voltmeter.

High-Speed. High-Speed Direct Connected Motors Demanded by Wood-workers, W. A. Furst. Elec. News, vol. 34, no. 18, Sept. 15, 1924, pp. 64-66, 4 figs. Discusses high speeds available, effect on quality of output, factor of slip in motors, calculating motor speeds, changing cycle of current, output of generators; individual motors on cutter heads are recent development resulting in call for 60-cycle current.

Induction. A New Self-Excited Synchronous Induction Motor, V. A. Fynn. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 744-748, 7 figs. Comparison of synchronous and asynchronous motors, combination of advantages of both in Danielson synchronous induction motor, self-excited synchronous induction motor; details of new type of synchronous induction motor giving satisfactory solution of difficulties.

A Special Application of Synchronized Induction Motors (Une application particulière des moteurs asynchrones synchronisés), M. Barrère. Revue Générale de l'Electricité, vol. 16, no. 3, July 19, 1924, pp. 115-119, 6 figs. Discusses principal methods of starting synchronous compensators, effect of starting on line voltage; starting with auto-transformer and with synchronized asynchronous motor.

Change-Speed Induction Motors, C. W. Kincaid. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 357-363, 20 figs. Discusses modifications to obtain speed changes, separate stator windings for each speed desired; three-phase, series-star low speed, parallel-star high-speed combinations.

Circle Diagram of the Osnos Motor (Das Kreisdiagramm des Osnos-Motors), T. Schmitz. Elektrotechnik u. Maschinenbau, vol. 42, no. 41, Oct. 12, 1924, pp. 601-605, 7 figs. Develops circle diagram of Osnos motor, a compensated induction motor, and compares this motor with a Sachsenwerk motor.

Circle Diagram of Polyphase Induction Motor. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 424, Nov. 1923, pp. 870-875, 8 figs. Shows that exact circle diagram can be derived in a simple and easy manner, without using inversion and other troublesome processes, by applying principle of superposition of currents. (In Japanese).

Effect of Phase Compensator on Slip and Overload Capacity of an Induction Motor (Der Einfluss des Phasenkompensators auf die Schlüpfung und Ueberlastungsfähigkeit des Induktionsmotors), S. A. Press. Archiv für Elektrotechnik, vol. 13, no. 5, Aug. 22, 1924, pp. 403-408, 1 fig. Develops equations and makes calculations; shows that motor may carry a triple overload.

Effect of Teeth on Torque-Speed Curve of Squirrel-Cage Induction Motors (Ueber den Einfluss der Zähne auf die Drehmomentkurve des Asynchronmotors), B. Aparoff. Elektrotechnik u. Maschinenbau, vol. 42, no. 39, Sept. 28, 1924, pp. 577-580, 8 figs. Theoretical investigation showing that torques arising from space harmonics of flux due to presence of teeth greatly exceed those due to arrangement of stator winding; oscillograms obtained of currents in rotor bars and end rings confirm theoretical deductions.

Efficiency of an Induction Motor (Rendement d'un moteur asynchrome), J. Vuillermoz. Électricien, vol. 40, no. 3153, Aug. 1, 1924, pp. 341-342, 1 fig. If Pu is mechanical power (from brake test) and Pa electric power absorbed by stator, then efficiency is η per cent $Pu/Pa = 100$.

Handy Tables for Use When Changing A. C. Windings for Different Frequencies, A. C. Roe. Indus. Engr., vol. 82, no. 4, Apr. 1924, pp. 187-193 and 211. How induction motors may be changed for operation at different frequencies, and effect of such changes on speed and horsepower.

Induction Motor with Unity Power Factor (Un motore asincrono con fattore di potenza uno), U. R. Andrei. Elettricista, vol. 3, no. 9, May 1, 1924, pp. 66-67, 2 figs. Describes compensated induction motor recently brought out by a Dresden, Germany, concern.

Polyphase Induction Type A. C. Motors. World Power, vol. 1, no. 3, Mar. 1924, pp. 186-188, 4 figs. Details of Peebles motors, manufactured by Bruce Peebles & Co., Edinburgh.

Rotary Shear of Single-Phase Induction Motors (Der Drehschub der allgemeinen Reaktionsmaschine), R. Brüderlin. Elektrotechnik u. Maschinenbau, vol. 42, no. 37, Sept. 14, 1924, pp. 553-558, 6 figs. Discusses field in air gap and shear in motors; develops formulas for calculating efficiency of single-phase induction motor.

ELECTRIC MOTORS, A. C.

Self-Compensating Induction Motors (Motore asincrono autocompensato), G. Sartori. Elettrotecnica, vol. 11, no. 22, Aug. 5, 1922, pp. 521-528, 15 figs. Discusses theory and principle of motor and its operation, speed characteristics, power factor, results of tests.

The Employment of A. C. Motors (Note sur l'emploi des moteurs à courants alternatifs), J. Mathivet. Revue Générale de l'Electricité, vol. 15, no. 12, Mar. 22, 1924, pp. 516-518. In author's opinion, installation of induction motors exceeding 100 hp. should be prohibited, or consumers should be made to pay for additional losses in addition to regular tariff; he shows that these losses would be very great for motors of 100 to 500 hp.

The New Compensated Induction Motors (Les nouveaux moteurs asynchromes compensés), C. Toulet. Vie Technique et Industrielle, vol. 5, no. 59, Aug. 1924, pp. 312-314, 4 figs. Discusses reactive current and its elimination, constructional and technical characteristics of compensated asynchronous motors and their advantages.

The Performance of Three-phase Induction Motors, T. F. Wall. World Power, vol. 2, no. 9, Sept. 1924, pp. 164-169, 10 figs. Discusses performance as influenced by change in supply pressure.

The Theory of the Circle Diagram (Zur Theorie der Kreisdiagramme), H. Pflieger-Haertel. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 486-493, 1 fig. Results of calculation are applied to circle diagram of 3-phase induction motor.

Theory and Working of Compensated Induction Motors (Die Theorie und Wirkungsweise der kompensierten Asynchronmotoren), Kade. Elektrotechnische Zeit., vol. 45, no. 19, May 8, 1924, pp. 456-461, 12 figs. Describes physical working of induction motors, design of which are based on Heyland's ideas; connection of 3-phase shunt commutator motor which can be used for speed regulation as well as for phase displacement, according to position of commutator brush.

Use of Polyphase Frequency Converters for Compensating Three-Phase Asynchronous Motors (Die Anwendung des mehrphasigen Frequenzumformers zur Kompensierung von Drehstromasynchronmotoren), L. Dreyfus. Archiv für Elektrotechnik, vol. 13, no. 16, Sept. 30, 1924, pp. 507-520, 7 figs. Theory and calculation of an arrangement for medium- and large-sized machines for compensating an induction motor by means of special frequency converters rotating synchronously with main motor.

Winding and Connecting Small Single-Phase Motors, C. A. M. Weber. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 377-382, 29 figs. Discusses single-phase a.c. with split-phase primaries and squirrel-cage rotors, and with single-phase primaries and wound rotors; methods of winding primaries, slot insulation, etc.

See also Fynn-Weichsel; Kapp Vibrator; Railway; Speed Regulation; Squirrel-Cage; Starting; Synchronous; CONDENSERS, Static.

Iron Losses. Surface Iron Losses with Reference to Laminated Materials, T. Spooner and I. F. Kinnard. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 723-729, 7 figs; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1175-1176. Details of tests with experimental salient-pole machine and experimental three-phase induction motor, showing that surface losses of air-gap induction vary approximately as 1.5 power of tooth frequency, from second to first power of 2 with increase of 2, and as first power of slot pitch.

Kapp Vibrator. Influence of the Kapp Vibrator on Induction Motors (Influence du vibrateur de Kapp sur les moteurs asynchrones), J. Kucera. Revue Générale de l'Electricité, vol. 15, nos. 19 and 20, May 10 and 17, 1924, pp. 819-827 and 875-878, 9 figs. Study of Kapp vibrator; theory upon which it is based; and its advantages.

Model Air Propellers. Electric Motors for the Drive of Small Model Air Propellers (Motoren zum Antrieb von kleinen Modell-Luftschrauben), J. Ackeret. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 10, May 26, 1924, pp. 101-103, 9 figs. Describes use of small 3-phase motor for wind-tunnel tests.

Operation and Maintenance. Alternating-Current Motors, Operation and Maintenance. South. Engr., vol. 41, no. 4, June 1924, pp. 42-49, 15 figs. Application of various types of a.c. motors and some of their characteristics.

Operation of Alternating-Current Motors, W. R. Bowker. South. Engr., vol. 42, nos. 3 and 4, Nov. and Dec. 1924, pp. 59-61 and 46-50, 11 figs. Nov.: Theory of polyphase induction motors; true and apparent power-starting and speed control of induction motors. Dec.: Starting motor, operating single-phase motors from three-phase service, and variable-speed three-phase motors.

Phase Changing. Practical Data for Use When Changing Single-Phase Motors to 2-or 3-Phase, A. C. Roe. Indus. Engr., vol. 82, no. 5, May 1924, pp. 232-234 and 258. Step-by-step details for these changes and handy tables for use on a variety of jobs.

Phasing Out. Phasing Out Synchronous Motors, J. A. Caparo. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1101-1102, 11 figs. Example of application of vectors in solving practical problem.

Induction Motors on Unbalanced Circuits, A. M. Dudley. Elec. Jl., vol. 21, no. 7, July 1924, pp. 339-343, 3 figs. Discusses vector methods of analysis of unsymmetrical systems.

Induction Motors with Low-Power Synchronizing (Les moteurs asynchrones synchronisés de faible puissance), J. Le Monnier. Revue Générale de l'Electricité, vol. 15, no. 7, Feb. 16, 1924, pp. 257-262, 8 figs. Review of efforts recently made for development of such motors; describes three types of different design but based on same principle, and points out their advantages.

Method for Experimental Determination of Primary and Secondary Reactance in Induction Motors (En metode til eksperimentel bestemmelse av stator- og rotorreaktans i asynkrone induktionsmaskiner), J. B. Barth. Elektroteknisk Tidsskrift, vol. 37, nos. 1 and 2, Jan. 8 and 15, 1924, pp. 1-8 and 11-13, 17 figs. Machine is driven at double synchronous speed, and electrical measurements are made from which reactance of primary and secondary windings may be calculated.

Polyphase Induction Motors, G. Windred. Electrician, vol. 92, no. 2387, Feb. 15, 1924, pp. 190-191, 3 figs. Notes on the various methods of starting and speed control.

Polyphase. See Commutator; Induction.

Polyphase Synchronous. See Starting.

Protection. Protection of Motors (La protection des moteurs), L. Lagron. Electricien, vol. 55, no. 1359, Nov. 1, 1924, pp. 481-483, 8 figs. Reviews different methods of protecting motors when current gives out, and describes a device especially applicable to 3-phase motors, affording protection in all cases of voltage drop or absence of current.

Railway. Summary on Induction Traction Motors (Riassunto di studi su locomotori con motori asincroni), G. Bianchi. Elettrotecnica, vol. 11, nos. 15 and 16, May 25, and June 5, 1924, pp. 334-340 and 361-364, 24 figs. Summarizes ques-

tions of construction of induction motors used in three-phase and monopolyphase traction; speed regulation, three-phase systems with commutation of poles; polyphase and irregular systems with commutation of poles, speed changes, rheostats, etc.

Repulsion. The Atkinson-Type Repulsion Machine as a Motor and Generator, F. J. Teago. Instn. Elec. Engrs.—Jl., vol. 62, no. 332, Aug. 1924, pp. 720-726, 12 figs. Results of experiments made by research students, under direction of author, on a 25-period single-phase Atkinson-type repulsion motor in Laboratories of Applied Electricity, Liverpool Univ.

See also Squirrel-Cage.

Rotary. Saturation of Rotary Current Motors With Reference to Form Factor of Tension (Die Sättigung von Drehstrommotoren in Beziehung zum Formfaktor der Spannung), H. Schübbe. Elektrotechnischer Anzeiger, vol. 41, nos. 168 and 169, Oct. 18 and 21, 1924, pp. 929-930 and 941-942 and 944, 5 figs. Discusses form of tension curve, form factor and amplitude factor, flux of motor, number of windings, etc.

Rotor Slot Wedges and Shaft Keys. Calculation of Wedges and Dovetails (Kräftespiel und Festigkeit von Tragkeilen), F. László. Elektrotechnische Zeit., vol. 45, no. 20, May 15, 1924, pp. 493-495, 8 figs. Pole pieces on most generators and synchronous motors are secured to revolving shaft by means of dovetail construction, and windings in armature slots are frequently retained by wedges. Mathematical paper showing that no exact and fully reliable method is known for calculating forces in these machine parts. Describes testing machine which when used with delicate optical measuring devices, gives location and exact magnitude of these forces.

Series. Single-Phase Series Motors, G. Fox. Southern Engr., vol. 40, no. 6, and vol. 41, no. 1, Feb. and Mar. 1924, pp. 53-55 and 41-45, 14 figs. Feb.: Self-excited shunt induction motors. Starting motors, power factor and characteristics. Mar.: Repulsion, unity power factor motors and their operating characteristics.

Single-Phase. A New Type of Single-phase Motor, S. R. Bergman. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 599-603, 11 figs. Development of a constant-speed a.c. motor for application to single-phase current. Describes derivation of this new type of motor from plain repulsion motor. Has characteristics of a shunt motor over running range, and series type characteristics during starting and acceleration. Possesses high power factor.

Single-phase Variable-Speed Motors, N. P. Perez. Elec. Rev., vol. 94, no. 2415, Mar. 7, 1924, pp. 364-365, 3 figs. Discusses shunt method of speed control.

See also Induction; Series.

Speed Regulation. Speed Regulation of Induction Motors in Sub-Synchronous and Hyper-Synchronous Range According to the Brown Boveri-Scherbius System (Die Regelung der Drehzahl von Induktionsmotoren im unter- und übersynchronen Gebiet nach System Brown Boveri-Scherbius), Seiz. Elektrotechnik u. Maschinenbau, vol. 42, nos. 8 and 9, Feb. 24 and Mar. 2, 1924, pp. 109-112 and 128-136, 12 figs. Principle of speed regulation of induction motors; regulation according to Brown Boveri-Scherbius system; working of Scherbius machine; generative work of main motor, excitation of Scherbius machine; phase compensation and compounding of main motor; working characteristics and useful possibilities of system.

The Speed Regulation of Induction Motors by Three-Phase Commutator Motors Connected in Cascade, W. Seiz. Brown Boveri Rev., vol. 11, no. 7, July 1924, pp. 139-142, 3 figs. Details of Brown Boveri-Scherbius and rotating-field cascade systems for speed regulation of induction motors.

See also Induction.

Squirrel-Cage. Improvements in Rotors, J. F. Fries. Iron & Steel Engr., vol. 1, no. 1, Jan. 1924, pp. 61-63, 10 figs. Particulars of author's invention relating to method of forming and securing winding on rotors of squirrel-cage induction motors, and to producing a rotor of improved construction in which screws and other mechanical joints are dispensed with in securing winding in place.

Induction Squirrel-Cage Motor Starting at High Resistance (Moteur asynchrome à cage d'écureuil à démarrage à couple élevé et faible appel de courant), J. Larde. Arts et Métiers, vol. 77, no. 48, Sept. 1924, pp. 349-351, 5 figs. Describes a new type of squirrel-cage motor giving advantages of a motor with wound rotor and retaining low cost of construction and upkeep.

The Torsional Moment in Rotating-Field Induction Motors with Squirrel-Cage Rotor (Ueber den Verlauf des Drehmomentes bei asynchronen Drehfeldmotoren mit Käfiganker), P. Andronescu. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 453-485, 18 figs. It is shown how squirrel-cage rotor can be replaced by rotor having coils: behavior of field around rotor when there is only one coil on rotor; by introduction of induction coefficients the process of flow and torsional moment can be determined.

Theory and Calculation of the Squirrel Cage Repulsion Motor, H. R. West. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 783-790, 11 figs. Results of analytical study of operation of motor. Derivation of method of calculation is outlined and some of the more interesting results are given.

See also Crawling; Starting.

Starting. A Novel Method of Starting Polyphase Synchronous Motors, E. V. Clark. Instn. Elec. Engrs.—Jl., vol. 62, no. 334, Oct. 1924, pp. 878-881. States that difficulty experienced in starting up polyphase synchronous motor simultaneously with alternator supplying circuit is greatly reduced if alternator is of asynchronous type, and that with small laboratory plant this method of starting is extremely simple; outlines scheme for operating small synchronous motors with this method of starting and cites three fields where method may be of use, namely, testing shops of manufacturers, laboratories, and emergency use.

Automatic Starting of Synchronous Motors. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 282-283, 4 figs. Describes new type of controller for automatically starting synchronous motors in which reduced starting voltage is obtained through reactance coils.

Clutch Pulley for Squirrel-Cage Motors (La poulie D. E. M. et le démarrage des moteurs asynchrones en court-circuit), G. Leboupin. Revue Générale de l'Electricité, vol. 8, no. 23, June 7, 1924, pp. 1066-1070, 8 figs. Describes D. E. M. centrifugal clutch pulley to enable squirrel-cage motors to start light and thus to reduce duration of short-circuit current; pulley consists of series of wedges, driven by shaft and free to move outwards; at full speed, wedges fly outwards and drive pulley by friction; as speed increases oil is flung outwards into annular ring, so that coefficient of friction is increased and clutch engages smoothly; performance curves; tests have shown that it is suitable for motors up to 6 hp. and probably much higher.

New Method for Starting Induction Motors Without a Rheostat, K. I. Shinfer. Electritchestvo, no. 2, Feb. 1924, pp. 69-77, 10 figs.

ELECTRIC MOTORS, A. C.

Description of a modification of Görges method in which part of rotor winding is used as a rheostat winding. Method was tested in 60- and 10-hp. motors, and oscillograms of stator current are given. (In Russian.)

Starting Conditions in Alternating-Current Motors with Short-Circuited Rotor and Their Measurement (Die Anlaufverhältnisse beim Drehstrommotor mit Kurzschlussläufer und ihre Messung), R. Elsässer. Siemens-Zeit., vol. 4, nos. 6 and 7, June and July 1924, pp. 149-154 and 207-212, 12 figs. Discusses starting phenomena and measurements for explaining them, and considers most important means of eliminating damaging effects of starting.

The Görges Method of Starting Induction Motors (Ueber die Anlaufschaltung nach Görges für asynchrone Motoren), C. Schenfer. Elektrotechnik u. Maschinenbau, vol. 42, no. 10, Mar. 9, 1924, pp. 141-145, 7 figs. Describes method which employs either of two connections: (1) in one arrangement two unequal windings lie in same slots, and efficient mean factors induced in these windings by rotating magnetic field are subtracted algebraically, so that motor starts with reduced current; (2) in other arrangement the two windings have equal numbers of turns, but lie in different slots and belong to different phases, so that efficient mean factors induced in them are subtracted vectorially.

The Self-Starting of Squirrel-Cage Motors through Current Displacement (Ueber das Selbstanlassen von Kurzschlussmotoren durch Stromverdrängung, R. Mayer. Elektrotechnische Zeit., vol. 45, no. 8, Feb. 21, 1924, pp. 137-139, 8 figs. It is shown that current displacement has no effect on reduction of starting current, which is only brought about by increased leakage which is required for every current-displacing arrangement; displacement itself influences degree of starting current as a rule only in an undesirable way.

Three-Phase Motors with Self-Starting (Drehstrommotoren mit Selbstanlauf), A. Weddige. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 8, Feb. 23, 1924, pp. 173-176, 27 figs. Review of development; different arrangements developed during recent years; the Weissburg-Simplex self-starting motor.

See also Induction.

Synchronous. A Synchronized Induction Motor (Ein Asynchronmotor ohne Blindverbrauch), W. Weiler. Elektrotechnische Zeit., special spring no., 1924, pp. 8-10, 7 figs. Detailed theoretical and practical data on recently introduced type of 3-phase motor, which operates practically without phase displacement and which is being recommended between approximate limits of 4 and 75 hp.; for equal output it is claimed that new motor has slightly higher efficiency and smaller bulk and weight.

Benefit of Synchronous Motors, B. L. J. Moore. Elec. Wld., vol. 84, no. 14, Oct. 4, 1924, pp. 733-734. Study shows that this equipment, installed in large sizes, effects saving without preferential rate. In case analyzed, annual saving yielded return of 15 per cent on increased investment.

Bonusing Use of Synchronous Motors, H. B. Dwight. Elec. World, vol. 83, no. 6, Feb. 9, 1924, pp. 285-286. With or without power-factor rate clause it should be possible to secure increased use of corrective equipment by giving rebate on power bills based on kva. installed.

Frequency Starting of Synchronous Machines (Zum Frequenzanlauf synchroner Maschinen), R. Brüderlin. Elektrotechnische Zeit., vol. 45, no. 46, Nov. 13, 1924, pp. 1239-1240, 3 figs. Discusses proper adjustment of excitation and deduces a simple rule for it.

Graphic Method for Determining the Reversing Moment of a Synchronous Machine (Ein graphisches Verfahren zur Bestimmung des Kippmoments der Synchronmaschine), G. Lammeraner. Elektrotechnik u. Maschinenbau, vol. 42, no. 42, Oct. 19, 1924, pp. 614-617, 3 figs. Discusses a method which by direct connection of vector diagram and no-load characteristic enables predetermination of behavior of synchronous machines with single-pole at constant excitation and constant terminal voltage.

Locating Faults in Synchronous Motors, A. A. Fredericks. Power, vol. 60, no. 12, Sept. 16, 1924, pp. 451-453, 3 figs. Difficulties that may be experienced in operation of synchronous motors and causes of heating in bearings and windings.

On the Synchronization of an Induction-Type Synchronous Motor, Yasusl Watanabe. Denki Gakkwai Zasshi (Inst. Elec. Engrs. of Japan—Jl.), no. 428, Mar. 1924, pp. 207-226, 34 figs. Motion of rotor of induction motor during synchronizing period with d.c. excitation may be expressed by differential equation of second order; discusses graphical solutions of this equation, etc. (In Japanese.)

Oscillations and Resonance in Systems of Parallel Connected Synchronous Machines, H. V. Putman. Franklin Inst.—Jl., vol. 197, nos. 5 and 6, May and June 1924, pp. 603-621 and 787-820, 6 figs. Develops method for calculating resonance frequency of two synchronous machines electrically in parallel; theory for calculating actual power pulsations which occur in systems of two and three synchronous machines connected to reciprocating apparatus; with some approximation theory is extended to four machines and general method for n machines is suggested; simple methods of calculating correct sizes of flywheels necessary for successful parallel operation of engine-driven generators.

Synchronous Motor Operation, H. Cotton. Electrician, vol. 92, no. 2388, Feb. 22, 1924, pp. 220-221 and 229, 4 figs. Analysis of phenomenon of pulling into step.

Synchronous Motors for Cement Mill Drive, G. E. Cassidy. Cement & Eng. News, vol. 36, no. 7, July 1924, pp. 15-21 and 23, 10 figs. Discusses various types of motors now in common use in industry. Abstract of paper read before Portland Cement Assn.

The Control of Synchronous Motors, H. D. James and J. H. Graybill. Elec. Jl., vol. 21, no. 7, July 1924, pp. 335-339, 4 figs. Discusses field frequency method and time element method of control and both combined.

The Synchronous Induction Motor, H. Cotton. World Power, vol. 2, nos. 6, and 7, June and July 1924, pp. 329-337 and 45-50, 14 figs. General theory and operation of synchronous induction motors, conditions of slip, equation of slip motion and its solution for special cases.

The Synchronous Motor in Steel-Mill Service, D. W. Dean. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 428-433, 10 figs. Characteristics of synchronous motors; comparison to induction motors; customary applications; advantages and disadvantages.

Three-Phase Motors with Power Factor cos $\phi = 1$ (Drehstrommotoren mit Leistungsfaktor cos $\phi = 1$), H. Ott. Elektro-Jl., vol. 4, no. 6, June 1924, pp. 156-161, 19 fig. Details of the Levy's "synasynmotor" (synchronized asynchronous motor), principle of connections, operating curve, etc.

See also Starting.

Three-Phase. Three Phase Motors with Variable Speed, Johnstone-Taylor. Power House, vol. 17, no. 14, July 20, 1924, pp. 23 and 39-40, 2 figs. Electrical designers evolve new type with widely

varying speed range, capable of maintaining constant speed under varying load.

Variable Speed 3-Phase Motors. Engineering, vol. 117, no. 3047, May 23, 1924, pp. 658-660, 11 figs. Motors constructed by Brit. Thomson-Houston Co. and exhibited at Brit. Empire Exhibition.

See also Induction; Starting; Synchronous; Variable Reactance.

Variable Reactance. Three-Phase Machines with Variable Reactance (Drehfeldmaschinen mit veränderlicher Reaktanz), R. Brüderlin. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 12-29, 13 figs. Analytical investigation; application to special cases.

Variable-Speed. Variable-Speed Drives for Calico Printing Machines. Elec. Rev., vol. 94, no. 2411, Feb. 8, 1924, pp. 221-223, 2 figs. Describes variable-speed a.c. motor developed by Brit. Thomson-Houston Co. and its application of 5-color printing machine.

See also Commutator; Single-Phase; Three-Phase.

Voltage Changes. Making Voltage Changes on A. C. Motors, A. C. Roe. Indus. Engr., vol. 82, no. 3, Mar. 1924, pp. 131-137 and 158, 2 figs. Directions and data in tabular form for changing voltage of a.c. motors by reconnecting existing winding, by changing coil pitch and chord factor, or by rewinding coils.

Wave Windings. Methods of Laying Out Wave Windings for A. C. Motors, A. C. Roe. Indus. Engr., vol. 82, nos. 9, 10, 11, and 12, Sept., Oct., Nov., and Dec. 1924, pp. 428-435 and 458; 483-489 and 507; 532-537 and 554-555; and 580-583, 43 figs. Sept.: How to lay out and construct two-layer wave windings for two- and single-phase stators of induction motors. Oct.: Construction and rules as applied to three-phase windings of this type; winding more than two coils per cell, and methods of paralleling coils. Nov.: Short-cut methods and tabulations of data for use in laying out this type of winding. Dec.: Windings having 120-deg. spacing between line leads when number of slots is and is not a multiple of number of poles.

Windings, Losses in. See ELECTRIC MACHINERY, A.C. Windings, Losses in.

ELECTRIC MOTORS, D.C.

Armature Connections. Internal Connecting of D.C. Armatures (Conexiones internas de las armaduras de corriente continua), A. C. Roe. Ingenieria Internacional, vol. 12, no. 5, Nov. 1924, pp. 230-232, 6 figs. Discusses mistakes generally made and which may influence direction of rotation of motors and functioning of generators.

Armatures. See ARMATURES.

Braking. Rheostat Braking of a Direct-Current Series Motor (Le freinage rhéostatique du moteur série à courant continu), E. Herman. Revue Générale de l'Electricité, vol. 16, no. 15, Oct. 11, 1924, pp. 586-599, 18 figs. Theory of braking; characteristics of d.c. series motors; various arrangements for rheostat braking.

Commutation. The Commutation in D.C. Machines with Very Small Peripheral Speeds (Die Kommutierung in Gleichstrommaschinen bei sehr kleinen Umfangsgeschwindigkeiten), C. Schenfer. Elektrotechnik u. Maschinenbau, vol. 42, no. 18, May 4, 1924, pp. 273-275, 6 figs. When an ammeter is connected to armature coil of a d.c. armature and armature is very slowly turned, the dependence of short-circuit current of armature coil can be experimentally determined as function of torsion angle of armature.

Economic Criteria. The Economics of Power Consumption, D. J. Bolton. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 901-908, 2 figs. With special reference to small d.c. motors; possibility of determining frame of motor on economic instead of physical grounds; lays down basis for economic comparisons; examines efficiency of shunt motor when suitably under-run.

Electric Trucks. The Dimensioning of Electric Motors for Electric Trucks (Ueber die Dimensionierung der Elektromotoren für elektrische Nutzwagen), Rob. Schwenke. Motorwagen, vol. 27, no. 11, Apr. 20, 1924, pp. 183-185. Gives dimensions and characteristics of various makes of electric trucks, and discusses factors influencing them.

Iron Losses. Iron Losses in D. C. Machines, E. Hughes. Instn. Elec. Engrs.—Jl., vol. 63, no. 336, Dec. 1924, pp. 35-50, 19 figs. Analysis of iron loss in 6 d.c. machines with undistorted flux to determine: (1) effect of high flux density upon hysteresis loss; (2) hysteresis and eddy-current exponents over wide range of flux density; (3) ranges of frequency and of flux density over which total iron loss can be represented by given expression; etc. Increase of iron loss with load is examined; method of calculating iron loss for any degree of distortion of main flux.

Operation and Maintenance. Direct-Current Motors, Operation and Maintenance. South. Engr., vol. 41, no. 4, June 1924, pp. 35-41, 16 figs. Application of various types of d.c. motors.

Oscillations in. Hunting of Machines With Leonard Connection, Using Compound-Wound Generators as Starting Machine (Ueber das Pendeln von Maschinen in Leonardschaltung bei Verwendung eines Verbundgenerators als Anlassmaschine), W. Greve. Archiv für Elektrotechnik, vol. 13, no. 16, Sept. 30, 1924, pp. 409-440, 17 figs. Discusses oscillation phenomena in d.c. machines with Leonard connection when in armature circuit a compound-wound generator is used for compensating voltage drop, and the two characteristic forms these oscillations take.

Railway. Ventilated D.C. Traction Motors (Les moteurs de traction ventilés à courant continu), E. Heldé. Revue Générale de l'Electricité, vol. 15, no. 2, Jan. 12, 1924, pp. 55-61, 9 figs. Describes various systems employed for ventilation of traction motors, and refers to tests carried out in Europe and United States which show influence of ventilation on different functions of motor. Tables and curves showing comparisons between closed and ventilated traction motors.

Reconnecting. Changing a Series Motor to Shunt or a Shunt to a Series, A. C. Roe. Power, vol. 59, no. 19, May 6, 1924, pp. 721-722, 2 figs. Describes method of conversion.

Reconnecting Direct-Current Machines—Change in Speed, A. C. Roe. Power, vol. 60, no. 6, Aug. 5, 1924, pp. 212-215, 5 figs. Three problems worked out showing how to figure winding for change in speed of shunt, compound, and series motors.

Reconnecting Direct-Current Machines—Changing Speed and Voltage, A. C. Roe. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 363-365, 4 figs. Problems are worked out showing how to figure a new winding for a shunt compound and series motor to operate with a change in speed and voltage.

Series. See also Braking.

Speed Regulation. See ELECTRON TUBES, D.C. Motor Speed Regulation.

Speed Regulator. Speed Regulator for Single Motor Drive, J. H. Ashbaugh. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 390-393, 7 figs. Details of speed regulator insuring accuracy and ease of operation which can be used on installations where armature voltage control is impossible and speed regulation must be obtained solely by motor field control.

Starting Boxes. Three- and Four-Point Starting Boxes for Direct Current Motors, H. J. Wolf. So. Engr., vol. 41, no. 6, Aug. 1924, pp. 57-58, 5 figs. Discusses wiring connections for series, shunt, and compound wound motors.

Starting Moment. A Method of Measuring Starting Moments (Eine Methode zur Messung von Anlaufmomenten), R. Brüderlin. Elektrotechnik u. Maschinenbau, vol. 42, no. 5, Feb. 3, 1924, p. 57, 3 figs. Method is said to have advantage that speed, independent of turning moment, rigidly retains its value, so that readings can be effected without disturbance.

Switching Surges in High-Voltage. Switching Surges in High-Voltage Motors (Les phénomènes de surtension à la mise en marche des moteurs électriques à haute tension), M. Margand. Revue de l'Industrie Minérale, no. 80, Apr. 15, 1924, pp. 193-204, 5 figs. Discusses cause and prevention of electrical breakdowns in certain high-speed 5700-volt motors used underground to drive mine pumps; methods employed in investigation and conclusions.

Testing. Tests To Make on Direct-Current Motors When Putting Them Into Service, C. A. Armstrong. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 398-400, 9 figs. Methods for determining if connections are correct on series, shunt, and compound motors before putting them into service, and how to test polarity of series- and shunt-field coils in compound motors.

Type Determination. Tests for Determining Type of Direct-Current Machines, B. A. Briggs. Power, vol. 60, no. 15, Oct. 7, 1924, pp. 573-576, 15 figs. Shows how to distinguish between different types of d.c. motors, also between d.c. machines and a.c. computation-type motors.

ELECTRIC PLANTS

[See also CENTRAL STATIONS; HYDRO-ELECTRIC PLANTS.]

Argentine. Regulations for Electric Installations (Reglamentacion para instalaciones eléctricas). Boletin de la Asociación Argentina de Electrotécnicos, vol. 10, no. 5-6, May-June 1924, pp. 81-108. Text of regulations by Argentine Electrotechnic Assn., covering general protective measure, machines, transformers, storage batteries, switchboards, lighting accessories, conductors, layout of plants, etc.

Central Stations. See CENTRAL STATIONS.

Interconnection. See SUPERPOWER.

Layout. Notes on Electric Plants (Notas sobre instalaciones eléctricas). Ingeniería y Construcción, vol. 2, no. 22, Oct. 1924, pp. 440-447. Discusses lighting and motive power, calculation of conductors and maximum loads, overhead lines, general layout of plants, dynamos and motors, storage batteries, and transformers.

Mines. Small Power Centrals for Mines (Las pequeñas centrales térmicas mineras), M. Grech. Anales de la Asociacion de Ingenieros del Instituto Católico de Artes e Industrias, vol. 3, no. 4, 1924, pp. 342-349, 9 figs. Discusses conditions such electric power plants must satisfy and describes layout and working of Aldea-Moret (Cáceres) plant for supplying power to tricalcic phosphate mine of Unión Española de Explosivos.

Protection. Protection of Electric Plants against Wrong Operations (Protection des installations électriques contre les fausses manoeuvres), A. Parisis. Revue de l'Industrie Minérale, no. 96, Dec. 15, 1924, pp. 557-567, 12 figs. Describes individual and central locking devices which are applied to make wrong operations impossible; examples of application at high-tension plant of Compagnie Houillère de Bessèges.

Steam-Electric. See STEAM-ELECTRIC PLANTS.

Substations. See SUBSTATIONS.

Troubles. The Secret Maladies of Electric Installations (Les maladies secrètes des installations électriques), G. Capart. Revue Universelle des Mines, vol. 3, no. 4, Series 7, Aug. 15, 1924, pp. 182-192, 6 figs. Discusses high-power motors, strains to which they are subjected and fatigue affecting their life, and advises adoption of higher safety factors and of elastic joint between system and motor or low-capacity condenser.

Windmill-Driven. See WINDMILLS.

ELECTRIC POWER

Calculation. Calculating Electric Energy, Taking into Account the Reactive Current (Die Verrechnung elektrischer Energie unter Berücksichtigung der Blindströme), W. v. Krukowski. Siemens-Zeit., vol. 4, nos. 6 and 7, June and July 1924, pp. 160-164 and 217-222, 7 figs. Summarizes present position as to reactive current and gives suggestions for choice of suitable methods of calculation, cost of electric energy, apparatus for calculation, etc.

Development. New Fields of Research for Power Development, E. W. Rice, Jr. Gen. Elec. Rev., vol. 27, no. 9, Sept. 1924, pp. 572-579. Survey of what past and present research has accomplished and what trends of investigation appear to be most worthwhile in future. Abstract of paper read at Lond. Power Conference.

Power Development in 1923, H. P. Liversidge. Elec. Wld., vol. 83, no. 1, Jan. 5, 1924, pp. 11-15, 8 figs. Advances made in generation, transmission and distribution; importance of cable development; higher distribution voltages used; future needs and trends.

France. Importation into France of Foreign Power, and the Water Power Situation in Switzerland (Importation en France d'énergie étrangère et situation de la houille blanche en Suisse), E. Garnier. Revue Générale de l'Electricité, vol. 16, no. 1, July 5, 1924, pp. 26-32, 1 fig. Discusses increasing power production in Switzerland and proposes import duty on power going into France.

Future Growth. Looking Ahead Ten Years, Rob. M. Davis. Elec. Wld., vol. 83, no. 1, Jan. 5, 1924, pp. 17-24, 4 figs. Survey indicates startling growth in next years; energy generated will triple; estimated present length and future growth of central-station transmission systems.

Generation from Coal Fields. Advantages of Generating and Distributing Electrical Energy Direct from Coal-Fields, J. B. Hamilton. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 667-674. Shows advantages of central power plant.

Government Ownership of Plants. Comments on the Proposed California Water and Power Act, A. E. Boynton. Jl. Electricity, vol. 53, no. 7, Oct. 1, 1924, pp. 238-241. Analyzes claims of proponents of government ownership and operation of power plants that power rates are lower under state and municipal ownership, and tells story of such projects as are still operating under this plan.

Great Lakes District's Consumption in 1950. Middle West Power in 1950. Elec. Wld., vol. 84, no. 2, July 12, 1924, pp. 64-65, 3 figs. Survey for part of Great Lakes district which has just been completed shows that per capita consumption will amount to 1760 kw-hr. per annum in 1950. Main reliance will be steam plants connected by transmission systems.

Hotel Supply. Use of Purchased Power in Hotels, W. H. Whitton. Elec. Wld., vol. 84, no. 6, Aug. 9, 1924, pp. 267-270, 3 figs. To eliminate all possible wastage central-station engineers should see that proper electrical and steam equipment is installed and later check up on

efficiency of operation; correction of wasteful practices.

Mining Industry, Witwatersrand, S. Africa. Power Supply to the Witwatersrand, T. G. Otley. S. African Instn. Engrs.—Jl., vol. 23, no. 1, Aug. 1924, pp. 210-226, 7 figs. Outline of general layout and design of Witbank generating station; present and prospective power consumption of mining industry.

Production. Electricity: Its Generation, Distribution and Utilisation at Refuse Disposal Works, G. W. Sainsbury. Surveyor & Mun. & County Engr., vol. 65, no. 1693, June 27, 1924, pp. 615-616. Discusses steam raising, generating plant and cost of generation, distributing and various uses.

Service. Contracting for Electric Power Service, S. Withington. Ry. Elec. Engr., vol. 15, no. 8, Aug. 1924, pp. 265-267, 1 fig. Suggested form of contract which provides for power at cost with increasingly better service.

Superpower. See SUPERPOWER.

Transmission. Power Transmission, F. C. Hanker. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 33-34. Brief review of development, pointing out power limitation of long-distance, high-capacity systems.

ELECTRIC RAILWAYS

[See also STREET RAILWAYS.]

Articulated Trains and Self-Propelled Cars. Articulated Trains and Self-Propelled Cars. Ry. Age, vol. 77, no. 15, Oct. 11, 1924, pp. 641-643, 1 fig. Review of report by Committee on Heavy Electric Traction of Am. Elec. Ry Assn., including study of light-weight equipment.

Australia. The Romance of Electric Railways in Australia, Stephen Q. Hayes. Elec. Traction, vol. 20, no. 6, June 1924, pp. 258-260, 1 fig. Power and railway developments on Australian mainland and adjacent islands.

Berlin, Germany. Electric Track Equipment of the Berlin North Suburban Lines (Elektrische Streckenausrüstung für die Berliner nördlichen Vorortbahnen), J. Rink. Siemens Zeit., vol. 4, no. 11-12, Nov.-Dec. 1924, pp. 437-441, 9 figs. Details regarding Stettiner Bahnhof-Bernau line, operated on 800 volts, d.c.; return rail arrangements, zinc covering of rail joints, welding-on of copper rail bonds, etc.

The Berlin North-South Line (Die Berliner Nordsüdbahn), M. Zangemeister. Verkehrstechnik, vol. 37, no. 25, June 20, 1924, pp. 251-260, 19 figs. Details of layout, connections with other lines, stations, rolling stock, machine shops, electric equipment and transformers.

Car Maintenance. Equipment Maintenance, F. M. Brinckerhoff. Elec. Ry. Jl., vol. 64, no. 13, Sept. 27, 1924, pp. 509-514, 8 figs. Discusses important considerations for expediting inspection and overhaul work; deals with such practical features of shop design as proper areas of floor space, use of lye tanks, provision for paint spraying and spray washing, adequate materials handling, and dipping and baking equipment.

Cars. Committee on Electric Rolling Stock, L. K. Sillcox. Ry. Age, (Daily Edition), vol. 76, no. 32, June 14, 1924, pp. 1560-1568, 3 figs. Proposed outline for future work; recommended instructions for maintenance of electrical equipment of rolling stock; operating problems encountered in handling of long freight trains under electric operation on heavy grades; discussion. Report presented before Am. Ry. Assn.

New Direct-Current Motor Coaches, F. Eckinger. Brown Boveri Rev., vol. 11, nos. 11 and 12, Nov. and Dec. 1924, pp. 243-249 and 268-273, 15 figs. Describes types used on Swiss light and local railways.

See also CARS, Interurban.

Cars, Berlin North-South Line. New Cars for the North-South Line in Berlin (Neue Wagen der Berliner Nordsüdbahn), M. Kemmann. Verkehrstechnik, no. 13, Mar. 28, 1924, pp. 115-118, 5 figs. Discusses design of cars to facilitate traffic movement, self-ventilating motors, multiple-unit trains.

Cars, Mersey Ry. New Equipments on the Mersey Railway, C. Corbridge. Elec. Ry. & Tramway Jl., vol. 50, no. 1228, Mar. 14, 1924, pp. 122-127, 6 figs. Principal particulars of an electric line in England. Data on rolling stock and equipment, and description of new motor cars.

Cars, Safety. New Safety Cars for Ontario Hydro Electric Railways. Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 184-185, 2 figs. Details of 400-class cars, which will be equipped for multiple-unit operation.

Chemistry in Service of. Chemistry in the Service of the Electric Railway, F. A. Bent. Elec. Traction, vol. 20, no. 7, July 1924, pp. 311-314, 2 figs. Describes chemical laboratory of Pacific Elec. Ry. of Cal.; chemical specifications; checking manufacturers; lubrication tests; paint tests; idiosyncrasies of painters; plating, etc.

Contact System. Contact System for Virginian Electrification, C. L. Hancock. Ry. Elec. Engr., vol. 15, no. 12, Dec. 1924, pp. 419-420, 3 figs. Entire construction including contact wire, messenger and fittings to be nonferrous material.

Contact Wires. Basis for Determination of the Standard Contact Wire Section for Electric Train Operation of the German State Railways (Grundlagen und Berechnungen zur Einheitsfahrleitung für die elektrischen Zugförderungsanlagen der Deutschen Reichsbahn), Naderer. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 197-205, 19 figs. partly on supp. plates. Reasons for selection of a certain section of contact wire for electric train operation. Calculates influences of temperature variations and wind action, latter being most important.

Coördination with Motor-Bus Transportation. Coördination of Other Forms of Transportation with the Electric Railway, P. Shoup. Elec. Ry. Jl., vol. 64, no. 15, Oct. 11, 1924, pp. 625-628. Points out that eventually buses will have to carry same obligations as traction companies; duplication of service impairs efficiency and results in higher fares. (Abstract.)

Fault Localizing. New System for the Automatic Isolation of Faults on Traction Lines (Nouveau système pour l'isolement automatique des défauts sur les lignes de traction), P. Quoirez. Technique Moderne, vol. 16, no. 22, Nov. 15, 1924, pp. 786-789, 7 figs. Particulars of Sprecher & Schuh system used on Sihlbrugg-Zurich line for isolating faulty sections, in which any short-circuited section is at once taken out of circuit.

Germany. Electrotechnics at the 1924 Technical Railway Exposition (Die Elektrotechnik auf der eisenbahntechnischen Ausstellung 1924), Wechmann. Elektro-Journal, vol. 4, no. 9, Sept. 1924, pp. 241-256, 31 figs. Design and construction of electric locomotives for passenger and freight trains, at Seddin stations, for V.D.I. Railway session, also motor cars, shunting engines, crane cars, etc.

Handling Long Freight Trains. Operating Problems Under Electric Motive Power. Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1192-1197, 3 figs. Methods in handling of long freight trains under electric operation on heavy grades. Report of sub-committee appended to report of committee on electric rolling stock, presented before Am. Ry. Assn.

Hendon-Edgware Extension, Eng. Hendon-Edgware Extension, London Electric Railway. Ry.

Gaz., vol. 41, no. 8, Aug. 22, 1924, pp. 244-249 and 255-256, 13 figs. Discusses Burroughs tunnels, bridges, etc., permanent way and signaling, stations, platforms and booking halls, details of equipment, method of operation, etc. Completes new "underground" lines serving north of London and provides growing residential area with convenient transport facilities.

The Hendon-Edgware Extension of the London Electric Railways. Engineer, vol. 138, no. 3582, Aug. 22, 1924, pp. 216-218, 8 figs. Notes on extension being made, particularly new automatic substation put in operation at Burnt Oak for supplying current to line.

Inspection Shops. Interborough Inspection Shop Methods. Elec. Ry. Jl., vol. 64, no. 7, Aug. 16, 1924, pp. 238-242, 5 figs. Inspection of elevated and subway cars on Interborough Rapid Transit Ry. is on basis of 1000 mi. for motor cars and 1200 mi. for trail cars; work is thoroughly planned; bonus is paid to finders of trouble of vital importance.

Japan. 1500-Volt Direct-Current Electric Railway Installation of the Kobe-Himeji Railway Co., Kobe, Japan, M. Takagi. Gen. Elec. Rev., vol. 27, no. 8, Aug. 1924, pp. 536-538, 4 figs. Details of rolling stock, multiple-unit passenger and freight cars, substation, etc.

Motors. See ELECTRIC MOTORS, Railway; ELECTRIC MOTORS, A.C., Railway; ELECTRIC MOTORS, D.C., Railway.

Operation. Cia Paulista de Estradas de Ferro, G. Bellows. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 312-317, 6 figs. Comparison of operating costs on Paulista Railway, first steam railway in Brazil to adopt electric traction, showing superiority of electric over steam operation.

Development of Electric Railway Operation in Central Germany (Die Entwicklung des elektrischen Vollbahnbetriebs in Mitteldeutschland), Heinemann. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 188-193, 4 figs. Indicates electrified lines, and describes power plants, substations, power transmission lines, locomotives, repair shops, and plans for future development.

Present Status of Electric Railway Operation (Gegenwärtiger Stand der elektrischen Bahnbetriebe), W. Usbeck. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, pp. 943-949, 20 fig. Reviews present electric railways in Germany, power houses, characteristics of modern distributing plants and their advantages.

Overhead Construction, Germany. Overhead Construction for German Railway. Elec. Traction, vol. 20, no. 9, Sept. 1924, pp. 415-416, 1 fig. Details of unusual refinement in overhead construction on Mittenwaldbahn; overhead is sectionalized or separated into sections which can be disconnected in case of disturbance; for return circuit running rails of track are used; special lighting protection.

Overhead Distribution and Contact Systems. Overhead Distribution and Contact Systems, R. E. Wade. Ry. Elec. Engr., vol. 15, no. 10, Oct. 1924, pp. 358-365, 18 figs. Factors in heavy electric-traction installations which make for economy and efficiency.

Overhead Lines Insulation. New Proposals for Insulation of Overhead Lines of Standard Gage Lines (Neuere Vorschläge für die Isolierung von Vollbahn-Oberleitungen), E. Altmann. Elektrotechnische Zeit., vol. 45, no. 39, Sept. 25, 1924, pp. 1022-1024, 16 figs. Discusses insulators for 15-kv. single-phase a.c. adopted for German Rys. and new forms of suspended insulators of a disruptive strength of up to 9000 kg., so-called "motor" insulators, and tests carried out with them by Brown-Boveri.

Paris Congress. Electric Traction at the 19th International Congress (La traction électrique au XIX^{e} Congrès international de Tramways, de Chemins de fer d'intérêt local et de Transports publics automobiles), L. A. Sekutowicz. Revue Générale de l'Electricité, vol. 16, no. 14, Oct. 4, 1924, pp. 545-557, 15 figs. A summary report discussing improvements in construction of motors and electric equipment, light car construction, etc.

Public Relations. How to Secure Better Public Relations, E. C. Hathaway. Elec. Ry. Jl., vol. 63, no. 4, Jan. 26, 1924, pp. 139-140. Bad treatment of utility corporations results from personal grievances of customers; public relations committee should make company better understood; its manager should take active part in civic affairs; correct attitude of employees important; securities should have wide distribution locally.

Rehabilitation. How the Indianapolis & Cincinnati Line was Rehabilitated. Elec. Ry. Jl., vol. 64, nos. 4, 5, and 6, July 26, Aug. 2, and 9, 1924, pp. 113-117, 163-166, and 203-206, 17 figs. Describes methods used for power supply with purchased energy; original high-tension lines were used with certain modifications; it is estimated savings from installation will pay its cost in ten years.

Return-Current Recovery. Recovering Current in Electric Railways With Intense Traffic and Frequent Stops (Application de la récupération aux chemins de fer électriques à trafic intense et arrêts fréquents), Bethenod. Société Française des Electriciens—Bul., vol. 4, no. 37, July 1924, pp. 643-652, 2 figs. Tests carried out show a saving of 20 per cent on expense of energy; drawbacks of step-up and step-down transformers and remedy; Ward-Leonard transformer; etc.

Safety Devices. Automatic Safety Devices for A.C. Trains with Special Reference to the Hamburg Elevated (Selbsttätige Zugsicherungsanlagen mit Wechselstrom unter besonderer Berücksichtigung der Analagen der Hamburger Hochbahn), C. Wolff. Zeit. des Vereines deutscher Ingenieur, vol. 68, no. 37, Sept. 13, 1924, pp. 970-975, 11 figs. Application of Thullen (American) safety system in which a train automatically indicates a section is clear as soon as it has left it.

Sleeping Cars. Sleep Via Traction. Elec. Traction, vol. 20, no. 9, Sept. 1924, pp. 413-414, 1 fig. Describes De Luxe sleeping cars for service between Indianapolis and Louisville.

Spain. Progress of Electric Traction in Spain, F. A. Shepley. Elec. Traction, vol. 20, no. 1; Jan. 1924, pp. 16-17, 4 figs. Also notes on some opportunities for American manufacturers.

Storage-Battery Traction. Storage-Battery Railway Traction (Traction électrique par accumulateurs sur les voies ferrées d'intérêt général), A. Ferrand. Revue Générale des Chemins de Fer, vol. 43, no. 5, Nov. 1924, pp. 343-367, 7 figs. Development of storage-battery traction; application in Germany, Austria, Alsace-Lorraine, United States, Switzerland and Italy, especially for motor cars; alkaline and lead batteries; concludes that for passenger and freight traffic battery traction is limited to light trains and small gradients.

Substations. See SUBSTATIONS.

Switzerland-Italy. Domodossola to Locarno, via the Centovalli. Ry. Gaz., vol. 40, no. 12, Mar. 21, 1924, p. 415, 2 figs. New electric mountain railway of narrow gage, 51 km. long.

Track. See ELECTRIC RAILWAYS, Track.

Traction Exhibit, Erie, Pa. Electric Traction Exhibit Held at Erie, Pa. Ry. Age, vol. 76, no. 25, May 24, 1924, pp. 1267-1269, 5 figs. Demonstration includes 3000-volt d.c. multiple-unit train for suburban service; current-collection tests; otheograph for recording action on rails of each

separate wheel of locomotive or motor car; locomotive tests.

Trolley-Wire Manufacture. See WIRE, Trolley, Manufacture.

Welded Rail Joints. See RAILS, Joints.

ELECTRIC RAILWAYS, TRACK

Construction and Maintenance. Track Construction and Maintenance, P. Goetz. Elec. Ry & Tramway Jl., vol. 51, no. 1259, Oct. 10, 1924, pp. 211-212. Report based on replies to questionnaire by 91 firms, of which 42 are German; contains information of width of gage used; superstructure material; grooved rails; built-up sections in curves; joint construction; standardization of points and crossings; curves. (Abstract.) Report to Int. Strassenbahn u. Kleinbahn Congress.

Joints. Experience with Bolted Joints in San Francisco. Elec. Ry. Jl., vol. 64, no. 25, Dec. 20, 1924, pp. 1028-1029, 10 figs. Among 16,000 joints of this type installed by Market St. Ry. during past 13 years only failures have been a few broken rail ends; redwood ties on rock ballast are used with concrete stringers under rails.

ELECTRIC RESISTANCE

Alloys. See ALLOYS, Electrical Resistance.

Contact. Contact Resistance (Der elektrische Uebergangswiderstand von Kontakten), W. Schälchlin. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 3, Mar. 1924, pp. 106-110, 20 figs. Derives relation between contact resistance and contact pressure for various metals, and gives results in ohms per lb.; investigates permanent or bolted contacts and movable or switch contacts; data for latter are of particular interest because they give valuable hints for proper design of switches; points out that copper upon copper gives best performance.

Low, Measurement of. Measurement of Low Resistance by Means of the Wheatstone Bridge, F. Wenner and A. Smith. U. S. Bur. Standards —Scientific Papers, no. 481, Jan. 11, 1924, pp. 297-305, 1 fig. Shows that measurements of conductors having a resistance as low as 0.01 ohm or even 0.001 ohm may be made to a fairly high accuracy by means of Wheatstone bridge with usual accessory apparatus.

Metals. Study of the Resistance of Metallurgical Products (Recherches sur la résistivité des produits métallurgiques), L. Guillet. Société Française des Electriciens—Bul., vol. 3, no. 30, Dec. 1923, pp. 641-662. Tests to determine conductance of commercial aluminum and influence of impurities and treatments; deoxidation of copper and casting of copper products.

Quarzilite Materials. "Quarzilite" Resistances (Eigenschaften und Anwendung des Quarzilit-Widerstandsmaterials), Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 10, Oct. 1924, pp. 510-517, 8 figs. By combining quartz and carbon according to new process a resistance material can be obtained which lends itself readily to being shaped while in its plastic state into almost any desired form; material is intended primarily as protective resistance for current transformers, relays, radio receivers, telegraph and telephone apparatus, etc.; resistance is in inverse proportion to voltage; material can be stressed as high as 60 watts per cu. cm. for 1 sec.

Wires Carrying High-Frequency A.C. Resistances of Wires for High-Frequency Alternating Currents (Ueber eine neue Methode zur Messung von Drahtwiderständen bei sehr schnellen Schwingungen), G. Wuckel. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 427-456, 15 figs. Measurement of a.c. resistances of wires for oscillations of wavelength varying from 4 to 5 m.; describes device by which falling off in energy along wires is measured, and resistance is calculated; results are given for wires of different metals.

ELECTRIC SPARKS

Formation. Formation of Electric Sparks in Gas Works Operation (Elektrische Funkenbildung in Gaswerksbetrieben), L. Rodde. Gas u. Wasserfach, vol. 67, no. 45, Nov. 8, 1924, pp. 679-680. Discusses formation of sparks due to static electricity, frictional or atmospheric, d.c. and a.c. switch sparks, and gap sparks, and gives various instances of spark formation due to friction in gases.

ELECTRIC SWITCHES

[See also CIRCUIT BREAKERS.]

Disconnecting. Disconnecting Switches for High Currents and Voltages (Trennschalter für hohe Stromstärken und Spannungen bis 35 KV), W. Nagel. Siemens-Zeit., vol. 4, no. 2, Feb. 1924, pp. 42-46, 7 figs. Development of design of modern types for use in large generating plants where currents of several thousand amperes combined with voltages up to 35 kv. have to be handled with safety; description of different types; tendency of disconnecting switches to open under heavy short circuit can be overcome by avoiding asymmetric field formation; general development and improvements of these switches is clearly demonstrated in illustrations.

Latches and Operating Sticks for Disconnecting Switches, H. J. Crabbs. Elec. Jl., vol. 21, no. 10, Oct. 1924, pp. 478-480, 9 figs. Gives characteristics of single-pole indoor switches, outdoor switches and operating sticks.

High-Voltage. High Voltage Switches by Voigt & Haeffner, A.-G. (Die Hochleistungsschalter der Firma Voigt & Haeffner A.-G.), M. Vogelsang. Elektrotechnische Zeit., vol. 45, no. 30, July 24, 1924, pp. 799-802, 8 figs. Discusses principles of design and describes constructional improvements, especially mechanism for rapid switching, and their action in overload or overvoltage.

Meter-Service. Facts Versus Fancies in the Meter-Service Switch Question, Jos. Sachs. Elec. World, vol. 84, no. 20, Nov. 15, 1924, pp. 1049-1054, 8 figs. Fundamental requisites of meter-service switch; safety comparisons; service essentials; economic considerations.

Oil. Single-Pole Oil Switches for a Tension of 4000 Volts and a Current of 1200 Amperes, Type FF. SS. (Interruttori unipolari automatici in olio per una tensione di 4000 Volt e una corrente di 1200 Amperes tipo FF. SS.), De Regibus. Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 6, Dec. 15, 1923, pp. 221-228, 12 figs. partly on supp. plates. Description with photographic views and detail drawings of apparatus and connections.

Oils for. See TRANSFORMERS, Oils.

Selection and Maintenance. See ELECTRIC FUSES.

Truck-Type Equipments. Truck-Type Switching Equipments, M. Cornelius. Elec. Jl., vol. 21, no. 5, May 1924, pp. 225-228, 9 figs. Design and advantages.

ELECTRIC TRANSMISSION LINES

Alternating-Current. Current and Voltage Conditions in Intermeshed Rotary-Current Systems in Permanent Short-Circuit (Strom- und Spannungsverhältnisse in vermaschten Drehstromnetzen beim Dauerkurzschluss), B. Koetzold. Elektrotechnische Zeit., vol. 45, no. 28, July 10, 1924, pp. 740-742, 19 figs. By way of example explains calculation of current and voltage at individual points of such system, which hitherto could only be done experimentally.

Influence of Iron Protection on the Loss in Voltage and on the Effective Resistance of Alter-

nating-Current Lines (Järnarmeringens inverkan på spänningsfall och effektivt motstånd hos växelströmsledningar), H. Svensson. Teknisk Tidskrift, vol. 54, no. 27, July 5, 1924, p. 124 (Elektrotechnik), 2 figs. Theoretical analysis is corroborated by experiments, permitting determination of coefficients used in formulas. Importance of laying cables close together to decrease self-induction is pointed out.

Cables. See CABLES, ELECTRIC.

Calculation. A Simple Method for the Calculation of Long High-Tension Lines (Eine einfache Methode zur Berechnung langer Hochspannungsleitungen), Wm. Rung. Elektrotechnische Zeit., vol. 45, no. 43, Oct. 23, 1924, pp. 1147-1148. Method of calculating no-load tension and short-circuit impedance.

A Vector Treatment of Long Transmission Lines, S. Holmes. Instn. Elec. Engrs.—Jl., vol. 62, no. 329, May 1924, pp. 471-476, 2 figs. Equations of transmission line; calculation for 250-mi., 110,000-volt transmission line; calculation for constant-voltage transmission, and of circle diagram. Bibliography.

Calculation of Electric Network with Minimum Material as a Network (Zur Frage über die Berechnung elektrischer Netze unter der Bedingung eines Minimums von Material), W. Chrustschoff. Archiv für Elektrotechnik, vol. 13, no. 2, May 31, 1924, pp. 109-123, 11 figs. Discusses determination of cross-section in closed network, including use of minimum of material, especially definite voltage drop, maximum uniformity of cross-sections, and little heating of line.

Chart for the Calculation of Characteristic Constants of Overhead High-Tension Transmission Lines (Abaque pour le calcul des constantes caractéristiques des lignes de transmission aérienne à haute tension), A. Blondel. Académie des Science —Comptes Rendus, vol. 178, no. 15, Apr. 7, 1924, pp. 1239-1244, 1 fig. Presents chart for direct determination of value of constants of characteristic impedance and propagation.

Graphs for Calculating the Distributing Systems of Electric Energy (Abaques pour le calcul des réseaux de distribution d'énergie électrique), M. Porchet. Revue Générale de l'Électricité, vol. 16, no. 3, July 19, 1924, pp. 105-115, 7 figs. Simplifies present methods of calculating conductors by construction of curves, and explains their application.

The Hyperbolic Method of Transmission Line Solution, H. Waddicor. World Power, vol. 2, nos. 8 and 9, Aug. and Sept. 1924, pp. 97-102 and 173-176, 7 figs. Aug.: Deals with mathematical solution for terminal conditions and includes fundamental line equations, giving numerical examples of hyperbolic method of solution; graphical solution for various terminal conditions; comparison of localized admittance methods. Sept.: Electrical conditions at intermediate points.

Conductors. See ELECTRIC CONDUCTORS.

Construction. Line Construction in Rough Country, J. D. Roberts. Elec. Light & Power, vol. 2, no. 7, July 1924, pp. 15-16, 41-45 and 69, 31 figs. Describes type of towers, tower foundations, erection of towers, stringing of conductors, and right of way.

Machine Building of Transmission Line, H. Cole. Elec. Wld., vol. 84, no. 13, Sept. 27, 1924, pp. 670-673, 7 figs. Description of methods pursued by Detroit Edison Co. in building 150 miles of 120-kv. double-circuit steel-tower transmission lines.

Report of A.R.E.A. Committee on Electricity. Ry. Elec. Engr., vol. 15, no. 4, Apr. 1924, pp. 123-125. Report presented at 25th annual convention giving specifications for electric power transmission and distribution pole lines.

Construction Cost Keeping. Line Construction Cost Keeping, F. H. Miller and F. W. Fackle. Elec. World, vol. 84, no. 26, Dec. 27, 1924, pp. 1349-1351, 4 figs. Simplified records determine continuous status of work under progress; foremen's reports constitute bases of accounting system followed by auditor serving with the force in the field.

Costs, Construction and Equipment. Actual Costs of Transmission Line and Substation. Elec. World, vol. 83, no. 26, June 28, 1924, pp. 1324-1327, 8 figs. Comprehensive data on 132-kv. system in Middle West; unit cost of line $8830 per mi.; details of towers and settings.

Corona. See CORONA.

Design. Electric Pole Lines. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 131-135, 10 figs. Design and construction of overhead transmission lines, with special reference to smaller industrial lines.

Overhead Electric Power Transmission, W. T. Taylor. Elec. Rev., vol. 94, nos. 2422 and 2423, Apr. 25 and May 2, 1924, pp. 646-647 and 721-722. Elements of design and economics.

Proper Transmission Lines: Aspects of Their Design, Wm. T. Taylor. Elec. Rev., vol. 94, nos. 2425, 2428, and 2429, May 16, June 6, and June 13, 1924, pp. 780-782, 907-909, and 979-981, 3 figs., and vol. 95, nos. 2444, 2445, 2446, 2449, 2450, and 2456, Sept. 26, Oct. 3, 10 and 31, Nov. 7, and Dec. 19, 1924, pp. 462-463, 515-517, 551-552, 647-648, 711-713, and 949-952, 6 figs. Economic requirements of design; physical and construction data; loading data; electrical and mechanical features; calculations for length and size of supports; first cost of construction.

Direct-Current. High Voltage Electricity Transmission, J. S. and W. E. Highfield. Engineer, vol. 136, no. 3576, July 11, 1924, p. 54, 4 figs. Advantages of direct-current transmission from point of view of lines and cables. Abstract of paper read at World Power Conference.

Earth-Current Control. Experimental Control of Traction Earth Currents (Il controllo sperimentale delle correnti vaganti), G. Revessi. Elettroteonica, vol. 11, no. 12, Apr. 25, 1924, pp. 271-273, 5 figs. Present methods of control by measurement of voltage drop between different points of system are claimed to be inadequate; author's proposed method is to take two connections not far apart on trolley line, two corresponding connections on track below, and to connect these four points together as double Thomson bridge.

Efficiency Diagrams. Current and Output Diagram as Basis for Construction and Operation of Large Transcontinental Power Plants (Strom- und Leistungsbild als Grundlage für den Bau und Betrieb grosser Fernkraftanlagen), C. Lommel. Elektrische Betrieb, vol. 22, no. 15, Aug. 10, 1924, pp. 142-147, 5 figs. Discusses control from central point of output of number of connected power stations with which it is connected by telephone.

Electrostatic Disturbances. On the Electrostatic Disturbance of Aerial Line, F. Shin. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 424, Nov. 1923, pp. 914-918, 3 figs. Results of investigations, in both theory and experiment, to ascertain whether or not electrostatic disturbances of aerial lines can be anticipated from change of capacities between lines. (In Japanese.)

German State Railway. Overhead Lines for the Electric Traction of the German State Railway (Die Fahrleitung für den elektrischen Zugbetrieb der deutschen Reichsbahn), Schieb. Elektro-Jl., vol. 4, no. 1, Jan. 1924, pp. 19-26, 15 figs. Dis-

cusses former types and development of new unit overhead line

Ground Protection. Ground Protection of High-Voltage Networks (Schutz von Hochspannungsnetzen gegen die Folgen von Erdschlüssen), J. Jonas. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, nos. 1 and 2, Jan. and Feb. 1924, pp 29-34 and 41-58, 11 figs. Discusses and compares features of three methods of protection of high-voltage networks against ground troubles, viz., direct grounding of Y-point, inductive grounding of Y-point, and phase grounding over artificial neutral; concludes that direct grounding is of advantage only for lines of more than 80 kv.; inductive grounding may be recommended regardless of voltage; phase grounding is best suitable for systems where number of lines to be protected radiate from station; comparative costs of three systems.

Grounded or Insulated Neutral. Insulation or Ground of the Neutral of a Three-Phase System (Isolement ou mise à la terre du neutre d'un système triphasé), A. Maudit. Revue Générale de l'Electricité, vol. 15, no. 10, Mar. 8, 1924, pp. 429-436, 8 figs. Study of two cases in which neutral is grounded directly in earth entirely insulated from sun, or connected with earth by intermediate of a resistance or inductance.

Grounding of Neutral. Indirect Grounding of Neutral (Mise indirecte du neutre à la terre), A. Maudit. Revue Générale de l'Electricité, vol. 16, no. 18, Nov. 1, 1924, pp. 693-701, 6 figs. Discusses operations of three-phase installations with neutral grounded indirectly through a resistance or an inductance; Petersen coil; etc.

Harmonics. See HARMONICS, Electric Transmission Lines.

Height Above Ground. Overhead Lines With Supports of Different Heights (Freileitungen an verschieden hohen Stützpunkten), A. Sengel. Elektrotechnische Zeit., vol. 45, no. 10, Mar. 6, 1924, pp. 185-186, 4 figs. Works out with help of diagrams relations which hold when poles or towers supporting line differ in height, and when ground between them is on a slope; effect of change of temperature considered and least height above ground worked out.

High-Tension. Calculation of Spans over Inclined Ground and Guyed Spans (Beitrag zur Berechnung von schiefen Einzelspannfeldern und von Spannfeldern mit Abspannketten), L. Truxa. Elektrotechnik u. Maschinenbau, vol. 42, no. 33, Aug. 17, 1924, pp. 501-507, 6 figs. Discusses calculation of crossing fields of high-tension lines crossing streets, railways and telephone lines.

High-tension Transmission Lines, E. V. Pannell. Engineer, vol. 137, nos. 3559, 3560, 3561, 3562, 3563, and 3564, Mar. 14, 21, 28, Apr. 4, 11, and 18, 1924, pp. 272-273, 300-302, 328-331, 352-354, 378-379, and 418-419, 26 figs. Study of engineering elements of modern transmission lines, grouped under following heads: conductors, insulators, supports; study of general subject of mechanical design; survey of construction economy.

Manufacture of Apparatus for Very High Voltages (La fabrication de l'appareillage à très haute tension), C. Chareyron. Houille Blanche, vol. 23, no. 89-90, May-June 1924, pp. 76-82, 11 figs. Discusses problems of high voltage engineer and describes apparatus built by Ateliers de Constructions Electriques de Delle, including insulators, oil testing and treating apparatus, oil circuit breakers, automatic releases, etc.

Modern High-Tension Power Transmission Lines, W. Dreyer. Eng. News-Rec., vol. 92, no. 1, Jan. 3, 1924, pp. 8-10, 3 figs. Problems in design of towers; economy of transmission at high voltage offsets greater construction costs; loads, spacing of towers, and costs of transmission lines.

The H. T. Transmission Lines and Track Equipment of M. G. E. So. African Power Engr., vol. 9, no. 75, July 1924, pp. 34-35, 3 figs. Discusses 88,000 volt transmission; imported galvanized steel structures; So. African steel for track work; big cable contracts.

See also Calculation; Direct-Current; 110,000-Volt; 135,000-Volt; 220,000-Volt.

Impact Waves. Measuring the Gradient of Impact Waves (Messung der Steilheit von Wanderwellen), E. Marx. Elektrotechnische Zeit., vol. 45, no. 41, Oct. 9, 1924, pp. 1083-1084, 2 figs. Describes a method which allows of approximate calculation of excess tension due to sparking in connection with insulators for high-tension transmission

Impedance. See Calculation.

Inductive Interference. Effect of Power Lines upon Telephone Lines [Beeinflussung von Fernmeldeleitungen (FM) durch Hochspannungsanlagen (H)], Jäger. Elektrotechnische Zeit., vol. 45, no. 18, May 1, 1924, pp. 417-428, 32 figs. Author investigates various kinds of coupling, such as capacity, induction and galvanic coupling for single-phase (railway), 3-phase, and rectifier systems; study of interferences between signal and power lines for perfect condition of latter and for ground faults; shows large number of oscillograms, giving examples of disturbances actually observed on telephone and telegraph lines; discusses protective devices for connection to signal lines and those for power lines.

Effect on Low-Tension Lines of High-Tension Lines Running Parallel to Them (Beeinflussung von Schwachstromleitungen durch parallel geführte Starkstromleitungen), A. Zastrow. Siemens-Zeit., vol. 4, nos. 9 and 10, Sept. and Oct. 1924, pp. 296-302 and 344-350, 5 figs. Extent of interference, galvanic, electric, and magnetic; and review of protective measures; advocates moving low-tension lines to a distance, or providing them with lead sheaths like cables.

Electrostatic Influence of Faulty Three-Phase Lines on Low-Tension Lines (Zur elektrostatischen Beeinflussung der Schwachstromleitungen durch gestörte Drehstromleitungen), E. Nather. Elektrotechnik u. Maschinenbau, vol. 42, nos. 24 and 40, June 15 and Oct. 5, 1924, pp. 380-383 and 590-594, 25 figs. June 15: Discusses effect of three-phase line with simple ground on parallel low-tension lines. Oct. 5: Approximate calculation of low-frequency no-load voltage and its ratio to terminal three-phase voltage.

Inductive Co-ordination as a Practical Problem, J. L. Clarke. Eng. Jl., vol. 7, no. 9, Sept. 1924, pp. 591-598, 7 figs. Review of subject of inductive interference. Coördinated transposition schemes; elimination of harmonics; residual voltages; effects produced by extraneous currents in communication circuits.

Inductive Interference with Communication Circuits, A. Russell. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 941-946. Discusses interference between power circuits and telegraph and telephone circuits; distinction is made between radiation and induction; experiment shows that in radio work approximate solutions can be obtained by assuming that earth is non-conductor and its inductivity is unity; thus it is shown that intensity of radiation field in simple cases falls off inversely as distance and inversely as wave length.

The Influence on a Lighting System of an A. C. Railway Line (Beeinflussung eines Lichtnetzes durch Wechselstrombahnbetrieb), Jäger. Elektrotechnische Zeit., vol. 45, no. 15, Apr. 10, 1924, pp. 329-331, 5 figs. Inductive interferences occurred in a d.c. lighting system in neighborhood of railway section electrified with alternating cur-

rent; investigation showed that disturbances occur only with grounded neutral.

Insulators. See INSULATORS, ELECTRIC.

Italy. Electric Lines in Sardinia (Le linee elettriche in Sardegna), L. Passerini. Elettrotecnica, vol. 11, no. 29, Oct. 15, 1924, pp. 718-723, 10 figs. Discusses line poles of wood on reinforced-concrete foundations; insulators; protection against excess voltage; etc.

Lightning. Lightning and Other Transients on Transmission Lines, F. W. Peek, Jr. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 697-709, 13 figs. Coördinates researches and observations on lightning with view to determining various types and order of magnitude of predatory voltages to which transmission lines are subject.

Lightning Arresters. See LIGHTNING ARRESTERS.

Line Losses Reduction. Reducing Line Losses in Long-Distance Transmission Lines (Hvorledes kan overföringstabene ved oplandscentraler formindskes?), W. Rung. Teknisk Tidskrift, vol. 54, no. 18, May 3, 1924, pp. 84-88 (Elektroteknik), 3 figs. Shows that about 75 per cent of losses in power systems in Denmark are due to wattless current. Shows that proper correction of power factor can be obtained by condensers connected to low-tension side of transformers. Computes most advantageous value of correcting current for different conditions.

Load and Sag Calculation. Calculation of Load and Sag of Overhead Lines on Stretching Chain Insulators (Berechnung der Beanspruchung und des Durchhanges von Freileitungen an schweren Abspannisolatorenketten), A. Robitschek. Elektrotechnik u. Maschinenbau, vol. 42, no. 38, Sept. 21, 1924, pp. 565-568, 1 fig. A new and simpler method giving same accurate results as longer methods used hitherto, and examples to show application.

Computing Tension in Transmission Lines, E. S. Thayer. Elec. Wld., vol. 84, no. 2, July 12, 1924, pp. 72-73, 1 fig. Describes method having correct mathematical and physical basis and giving results that are accurate to within one per cent.

Figuring Safe Line Loads, J. M. Walshe. Telephone Engr., vol. 28, no. 10, Oct. 1924, pp. 19-22. Concrete figures for determining safe pole-line loads; computations for seven typical arrangements of lines. Decay and poor alignment effects.

Long. The Limitations of Output of a Power System Involving Long Transmission Lines, E. B. Shand. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 219-229, 12 figs. Discusses conditions of stability of system and points out that degree of voltage regulation as determined by load conditions is important factor in determination of limit of output; proposes type of combined diagram whereby this factor and other characteristics of load may be included; considers numerical example of 300-mi. line and presents various characteristic curves.

Long-Distance. See Superpower System.

Long-Spans. A 900-Meter Span in a 130,000-Volt Transmission Line (Una campata di 900 metri in una linea a 130,000 volt), R. Norsa. Elettrotecnica, vol. 11, no. 7, Mar. 5, 1924, pp. 142-145, 3 figs. Particulars of steel towers 220 ft. long, made with mixed copper and "copper river Po at Piacenza, Italy, a span of 2500 ft.

Long Span on Cheat River, C. F. Sheakley. Elec. World, vol. 83, no. 25, June 21, 1924, pp. 1277-1278, 3 figs. West Virginia-Maryland Power Co. has strung at Gorge a 5-conductor span 4317 ft. long, made with mixed copper and "copper weld" conductors; details of towers and installation.

Maximum Output, Determination. Maximum Output of Transmission Systems, R. D. Evans and R. C. Bergvall. Elec. World, vol. 83, no. 23, June 7, 1924, pp. 1171-1173, 5 figs. Simple graphical method for determining maximum output of any given system; determination of maximum permissible load is difficult problem, but estimates may be made.

Mutual Induction of. Mutual Electromagnetic Induction in Case of Unsymmetrically-Arranged Three-Phase Long-Distance Power Transmissions (Om den gjesidige elektromagnetiske induktion ved usymmetrisk oplagte trefase fjernledninger), O. Strand. Elektroteknisk Tidsskrift, vol. 37, nos. 16 and 17, June 7 and 16, 1924, pp. 123-125 and 131-133. Theoretical deductions and their application to practical example.

100,000-Volt System, Saxony. A 100-Kv. 3-Phase Transmission System in Saxony (The 100-Kv. Netz der sächsischen Landesversorgung), A. Rachel. Elektrotechnische Zeit., vol. 45, nos. 2 and 4, Jan. 10 and 24, 1924, pp. 21-25 and 53-59, 18 figs. System 200 mi. in extent, tying together number of power plants, serves general electrification of Saxony; explains layout of outstanding transforming stations with complete plan drawings; all stations are completely housed in for both high-voltage and low-voltage side; principles governing layout of stations; shows how total cost of a 30,000-kva. substation is segregated; examples of very long spans with 100-kv. lines over rivers and valleys are shown on scale drawings; details of line construction with valuable operating experiences are given.

110-000-Volt. Design for 110-000-Volt Line, H. T. Pierce. Elec. Wld., vol. 84, no. 11, Sept. 13, 1924, pp. 506-510, 12 figs. Describes new transmission line of New England Power Co. which connects distant hydro plants and large industrial centers, particularly adapted to withstand severe periodic sleet storms.

120,000-Volt. 120,000-Volt Transmission in the Louron Valley (Le transport de force à 120,000 volts de la vallée du Louron), R. Sivoine. Electricien, vol. 55, nos. 1342 and 1343, Feb. 15 and Mar. 1, 1924, pp. 73-79 and 97-102, 17 figs. Describes hydroelectric plants of Bordère and Londenvielle, including pressure conduits and turbines; details of electrical equipment.

132,000-Volt. Design, Construction, and Operation Problems of a 132,000-Volt Transmission Line, R. E. Moody. Wis. Engr., vol. 29, no. 1, Oct. 1924, pp. 1-2, 16 and 18, 3 figs. Describes new steel tower transmission line from North Milwaukee to Plymouth, designed and built in 1923 by Milwaukee Elec. Ry. & Light Co.

135,000-Volt. 135,000-Volt Transmission Line Recently Constructed in Italy (Su di una linea a 135,000 volt recentemente costruita in Italia a grande al tezza sul livello del mare), F. Manfredi. Elettrotecnica, vol. 11, no. 3, Jan. 25, 1924, pp. 50-53, 7 figs. Particulars of a three-conductor copper line 90 km. long, from Carone to Cislago, and from 350 to 1685 m. above sea level; discusses variation of corona effect with altitude; critical voltage for conductors suspended 5 m. apart.

Overhead. A New Method for Calculating Overhead Lines (Eine neue Methode zur Berechnung von Freileitungen), E. Regli. Schweiz. Elektrotechnische Verein Bul., vol. 15, no. 6, June 1924, pp. 283-293, 5 figs. Details of new method based on fact that all catenaries are similar and can be used especially for extreme cases where two points of suspension have big difference in level.

Comparative Costs of Tower Line, H. S. Brubaker. Elec. Light & Power, vol. 2, no. 8, Aug. 1924, pp. 19-21, 41-46 and 58, 28 figs. Details of construction by three different methods: piece-by-piece method; towers built prone and later

up-ended into place; replacing concrete anchor by grillage type anchor; and their application in construction of Penn Power Co.

Electric Transmission Lines and Their Steel Masts, G. J. Gumersall. Colliery Engr., vol. 1, no. 3, May 1924, pp. 117-120, 4 figs. Modern practice in overhead-line work and design of steel masts for this purpose.

Overhead Lines on Suspended Insulators (Freileitungen an Hängeisolatoren), G. Markt. Elektrotechnische Zeit., vol. 45, no. 24, June 12, 1924, pp. 620-622, 7 figs. Discusses temperature changes and unequal distribution of load due to spans of unequal lengths.

Overvoltages. See OVERVOLTAGES.

Parellel Lines, Protection. Selective Protective Systems for Three or More Parallel Lines (Selektive Schutzsysteme für drei oder mehr parallele Leitungen), H. Giesbers. Elektrischer Betrieb, vol. 22, no. 7, Apr. 10, 1924, pp. 53-55, 7 figs. Critical investigation of different systems.

Poles. See POLES.

Power Limitations. Experimental Analysis of Stability and Power Limitations, R. D. Evans and R. C. Bergvall. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 329-340, 30 figs. Method of determining power limit of transmission system, taking into account characteristics of synchronous condensers and load in conjunction with those of transmission line: tests on voltage stability, hunting, and effect of short-circuits causing system to pull out of synchronism. (Abridged.)

Power Limitations of Transmission Systems, R. D. Evans and H. K. Sels. Am. Inst. Elec. Engrs. —Jl., vol. 43, no. 1, Jan. 1924, pp. 45-51, 8 figs. Discussion of methods of calculation, maximum power limits, and practical operating limit; analytical development upon which discussion is based.

Problems. Some Theoretical Considerations of Power Transmission, C. L. Fortescue and C. F. Wagner. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 106-113, 8 figs. Following points are developed: Proof of circle diagram maintaining therein idea of angle between generator and receiver voltages; it is shown how characteristics of synchronous condenser limit maximum power that can be transmitted over line; effect of character of load on stability; comparison of 500-mi. line with condenser at midpoint.

Protection. Horn-Shaped Conductors (Betrachtungen über den Hörnerableiter), F. Kesselring. Elektrotechnische Zeit., vol. 45, no. 31, July 31, 1924, pp. 819-824, 12 figs. Discusses protective value of horns, their drawbacks; describes Bendmann device, suitable for extinguishing ground arcs.

Protection Against Overload and Excess Current in High-Tension Installations (Beiträge zur Frage des Schutzes gegen Ueberspannungen und Ueberströme in Hochspannungsanlagen), A. Roth. Elektrotechnik u. Maschinenbau, vol. 42, nos. 31 and 32, Aug. 3 and 10, 1924, pp. 477-480 and 492-498, 17 figs. For protection of maximum voltage systems advocates direct zero point ground, ground cable, bridging of transformers and relays, etc.; protection of low-tension lines and against short-circuit currents.

Protection of Alternating Current Lines Against Over Voltage (Beiträge zur Frage des Schutzes von Wechselstrom-Anlagen gegen Ueberspannungen,) A. Roth. Schweiz. Elektrotechnische Verein Bul., vol. 15, no. 7, July 1924, pp. 348-361, 12 figs. Discusses damages to lines often wrongly attributed to overvoltage; explains causes of overvoltage and gives examples of application of rules established by Swiss Electrotechnic Union.

Rises in Pressure and Protection of Alternating-Current Circuits, G. W. Partridge. Elec. Rev., vol. 94, no. 2430, June 20, 1924, pp. 992-994, 5 figs. Describes system of actual prevention and protection from rises in pressure installed on an a.c. system after careful observations and experiments over a period of some five years.

Selective Protection and the System of Automatic Unloading of Line (Der Selektrivschutz und das System der selbsttätigen Entlastung), M. Schleicher. Elektrotechnik u. Maschinénbau, vol. 42, no. 29, July 20, 1924, pp. 453-458, 9 figs. Discusses principle of automatic unloading (German patent) of line under excessive load and gives examples of its application.

Selective Protection of High-Tension Three-Phase Transmission Lines (Problème de la protection sélective des lignes de transmission triphasées à très haute tension), J. Sarolea. Revue Générale de l'Electricité, vol. 16, no. 20, Nov. 15, 1924, pp. 779-789, 12 figs. Application of selective relays and principles on which relays should be constructed. Examples of application.

The Ium Selector and Its Applications in Electric Plants (Il selettore "ium" e le sue applicazioni negli impianti elettrici), A. C. Piva. Elettrotecnica, vol. 11, no. 7, Mar. 5, 1924, pp. 145-149, 5 figs. Particulars of a newly introduced apparatus for affording protection not obtainable by use of existing relays.

See also LIGHTNING ARRESTERS.

Relay Protection. Relay Protection as Applied to Large Transmission Network, R. Wilkins. Elec. Wld., vol. 84, no. 21, Nov. 22, 1924, pp. 1101-1106, 11 figs. System used by Pac. Gas & Elec. Co. shows 95 per cent correct operations out of more than 1500; scheme is based on separation of smallest practicable section of network.

Relaying. Operating Experiences with the Relaying of the Duquesne Ring, (Pittsburgh), H. P. Sleeper. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1158-1165, 6 figs. Gives partial log of relay operations on ring for first 11 months' service, showing that every case of trouble on lines has been cleared by proper relays.

Resonance in Ungrounded Networks. Resonance Phenomena in Ungrounded Networks (Spannungsresonanzerscheinungen in ungeerdeten Netzen), E. Cramer. Elektrotechnische Zeit., vol. 45, no. 3, Jan. 17, 1924, p. 44. In small factory supply system, operating at 500-volt, 3-phase current with underground cables, excess voltages of 940 volts against ground were observed, which were traced to small 500/110-volt single-phase transformer supplying lamps on traveling crane; resonance conditions were set up between this transformer and net; trouble was remedied by providing artificial neutral point and connecting this point solidly to ground; for all low-voltage systems grounding of artificial neutral point is recommended for safety.

Right-of-Way, Acquiring and Preparing. Acquiring and Preparing Right-of-Way, M. H. Wagner. Elec. World, vol. 84, no. 20, Nov. 15, 1924, pp. 1044-1046, 1 fig. Suggestions which experience has shown are worth heeding in selecting transmission-line route, surveying and marking for line supports, and establishing coöperation between right-of-way man and construction superintendent.

Rural. Cost Data on a 6,600-Volt Rural Line, J. C. Robinson. Elec. Wld., vol. 84, no. 14, Oct. 4, 1924, pp. 730-733, 6 figs. Cost data of line running from Lincoln Water & Light Co.'s plant at Lincoln, Ill., to Atlanta, Ill., 12.25 miles. Aluminum conductors with 250-ft. spans used, expense averaging $1215 per mile. Notes on construction of outdoor substation at Atlanta, which was built at a total expenditure of $4,940.48.

Economic Rural Power Transmission by Means of Galvanized Iron or Copper Lines with Ground Return (Distributions rurals économiques d'energie par lignes en fer galvanisé ou en cuivre avec retour par la terre), G. Viel. Industrie Électrique, vol. 33, no. 770, July 25, 1924, pp. 277-283, 6 figs. Discusses rural power production; single phase high tension galvanized iron or copper lines; comparison with three phase copper lines as to cost, precautions necessary for lines with ground return.

Safety-Factor. Uniform Coefficient of Safety for High-Voltage Lines (Contribution à la détermination d'un coefficient de sécurité mécanique à appliquer aux divers éléments constitutifs d'un réseau de distribution d'énergie électrique à haute tension), C. van Gastel. Revue Générale de l'Electricité, vol. 15, no. 3, Jan. 19, 1924, pp. 89-97. Gives and compares experiences and established standards of mechanical loads upon overhead high-voltage lines used in different countries; suggests that international mechanical safety factor be standardized for all overhead lines; rulings of United States and principal countries of Europe are considered and tabulated.

Sag. Measurement of Sag (Misura delle frecce), G. Rebora. Elettrotecnica, vol. 11, no. 3, Jan. 25, 1924, pp. 49-50, 5 figs. Describes simple method of determining sag that a conductor should have when being suspended.

Photometric Method for the Determination of Sag of Overhead Lines (Photometrische Methode zur Bestimmung des Durchhanges von Freileitungen), M. F. Dahl. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 3, Mar. 1924, pp. 116-119, 2 figs. Describes photographic method of recording or examining cable sags, which can be carried out during operation.

Sag of Overhead Lines (Durchhang von Freileitungen an schweren Abspannisolatorenketten), A. Sengel. Elektrotechnische Zeit., vol. 45, no. 17, Apr. 24, 1924, pp. 394-397, 4 figs. Gives method of calculation of stress and sag which is said to be simpler than other heretofore used methods having equal degree of accuracy.

The Calculation of Sag and Tension in High-Tension Overhead Lines (Beitrag zur Zustandsberechnung und Seilmontage in Einzelspannfeldern von Hochspannungsfreileitungen), R. Planner. Elektrotechnik u. Maschinenbau, vol. 42, no. 15, Apr. 13, 1924, pp. 225-230, 3 figs. Describes method which has advantages of rapid and simple determination of coefficients of state which make it possible to carry out very accurate stringing of cable.

See also Load and Sag Calculation.

Sectionalizing High-Voltage. Sectionalizing of High-Voltage Lines, Geo. H. Middlemiss. Elec. World, vol. 84, no. 26, Dec. 27, 1924, pp. 1363-1365, 5 figs. Describes automatic apparatus developed by Ala. Power Co.; switch has several unusual design features.

Self-Induction and Resistance Determination. An Alternating-Current Bridge Method to Determine the Self-Induction and Resistance of Short Lines (Eine Wechselstrombrücke zur Messung der Selbstinduktion und des Wirkwiderstandes an kurzen Leitungsstücken), U. Meyer. Elektrische Nachrichten-Technik, vol. 1, no. 1, July 1924, pp. 29-36, 4 figs. Theoretical analysis of subject followed by an example of its application to a practical case. Communication from Government Telegraph Dept.

Short-Circuit Currents, Calculating. Equivalent Single-Phase Networks, R. A. Shetzline. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1014-1020, 9 figs. For calculating short-circuit currents due to grounds on 3-phase star grounded systems.

Short-Circuits. Short-Circuit Calculating Board, L. G. Smith. Elec. Wld., vol. 84, no. 7, Aug. 16, 1924, pp. 308-311, 3 figs. Baltimore Co. designs table for two interconnected systems of 210,000 kw.; arrangements for metering, method of applying voltages, operation and use of board discussed.

Sinusoidal Currents. The Building-up of Sinusoidal Currents in Long Periodically Loaded Lines, J. R. Carson. Bell System Technical Jl., vol. 3, no. 4, Oct. 1924, pp. 558-566, 2 figs. Discusses general formulas and curves which describe building-up phenomena, as a function of line characteristics and frequency of applied electromotive force, in extremely important case of long periodically loaded lines.

Sleet Formation. Sleet Formation on Trolley and Transmission Lines, G. E. Luke. Elec. Traction, vol. 20, no. 1, Jan. 1924, pp. 18-19, 1 fig. Dangers due to ice or sleet coatings on overhead lines; means for preventing or removing ice; experimental data resulting from tests on trolley and transmission lines.

Stability. Transmission Line Stability, C. L. Fortescue. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 373-376, Analytic deduction of condition for stable operation for transmission lines. Supplement to paper by Fortescue and Wayne, entitled Some Theoretical Considerations of Power Transmission.

Stringing Conductors. Stringing Transmission Cable, O. Davidson. Elec. World, vol. 83, no. 17, Apr. 26, 1924, pp. 819-821, 7 figs. Nature of preliminary study, special equipment and methods employed on Indiana Elec. Corpn.'s 74-mo., 132-kv. line between Terre Haute and Indianapolis.

Superpower Systems. Superpower Transmission, P. H. Thomas. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 3-17, 6 figs. Economies and limitations of transmission system of extraordinary length.

Surveys and Field Engineering. Transmission Line Surveys and Field Engineering, O. Davidson. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, pp. 808-809. Preliminary paper location; instrument surveys, records and mapping; two parallel profiles; office and field location of towers; work of engineers on construction of new 75-mi. high-tension transmission line from Terre Haute to Indianapolis.

System Relay Committee. System Relay Committee, M. T. Crawford. Elec. World, vol. 83, no. 9, Mar. 1, 1924, pp. 420-422, 3 figs. How power system of Puget Sound Power & Light Co. has improved service reliability by forming coordinating committee to study troubles; details of work and organization.

33,000-Volt. 33,000-Volt Supply Scheme for Gorseinon. Engineering, vol. 117, nos. 3035 and 3036, Feb. 29 and Mar. 7, 1924, pp. 260-262 and 295-299, 25 figs., partly on p. 306. Describes scheme put into operation in South Wales as interesting example of bulk supply of electricity by overhead mains at high voltage.

Three-Phase. A Simple Method for Finding the Zero Voltage in Three-Phase Star Connections (Ein einfaches Verfahren zur Auffindung des Spannungsnullpunktes bei Drehstrom-Sternschaltung), W. Lehmann. Elektrotechnische Zeit., vol. 45, no. 41, Oct. 9, 1924, pp. 1086-1087, 6 figs. Details of a construction which gives position of zero voltage with simple means; examples.

Defective Currents and Ground in a Three-Phase Line; Influence of Receiving Transformer (Courants de défaut et courants à la terre dans un réseau triphasé: influence du transformateur récepteur), A. Mauduit. Revue Générale de l'Électricité, vol. 16, nos. 6 and 7, Aug. 9 and 16, 1924, pp. 227-233 and 259-262. Discusses variation in

distribution of currents to ground with nature and mode of connections of transformers, in line with neutral to ground at generating and receiving station.

The Electric Field in the Neighborhood of a Three-Phase Line (Le champ électrique au voisinage d'une ligne triphasée), L.-J. Collet. Annales des Postes Télégraphes et Téléphones, vol. 13, no. 7, July 1924, pp. 743-767. Discusses formulas of Maxwell, calculation of coefficient of potential and of coefficient of capacity.

Unbalanced Three Phase Lines of Four Wires (Déséquilibrage des lignes triphasées à quatre fils), M. Marre. Electricien, vol. 40, no. 1355, Sept. 1, 1924, pp. 385-389, 6 figs. Discusses three phase lines with neutral wire and develops formulas for calculations.

See also Voltage Drop.

Three-Phase Artificial. Design, Construction and Preliminary Test of the Three Phase Artificial Transmission Line, S. Pekku. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 424, Nov. 1923, pp. 893-913, 15 figs., partly on supp. plate. Describes fully line built at Electrochemical Laboratory. Discusses electrostatic and electromagnetic requirements to represent three-phase transmission line; line capable of working at 5200 volts continuously at 50 cycles; describes preliminary test performed on flat inductance coils; actual cost. (In Japanese.)

Towers. Comparative Data on Towers for High Tension Transmission, W. Dreyer. Eng. News-Rec., vol. 92, no. 5, Jan. 31, 1924, pp. 188-189, 3 figs. Single-circuit and double-circuit towers for 220-kv. and 110-kv. lines; towers for special problems.

Erecting Towers Assembled on Ground. Elec. World, vol. 83, no. 8, Feb. 23, 1924, pp. 369-372, 8 figs. Entire steelwork assembled on ground and tower erected by shear leg carried and operated by caterpillar tractor; arrangements for receiving and distributing steel, handling work of assembly and erection.

See also Construction; High-Tension; POLES, CONCRETE.

Transients on. See Lightning.

220,000-Volt. Transmission at 220 Kv. on the Southern California Edison System. Am. Inst. Elec. Engrs.—Jl., vol. 43, nos. 10 and 11, Oct. and Nov. 1924, pp. 901-908 and 1025-1030, 20 figs. Symposium with following contributions: Description of System and Operating Experiences, H. Michener; Automatic Protection—Balanced Relays and Flashover Control, E. R. Stauffacher; Economic Studies of Transmission Line Design with Particular Reference to Mechanical Features, C. B. Carlson; Economic Studies of Transmission Line Design with Particular Reference to Electrical Features, W. D. Shaw; Vibration of Conductors and Overhead Ground Wires, J. M. Gaylord; Location and Right of Way, V. D. Elliott.

Transmission at 220,000 Volts, H. A. Barre. Elec. World, vol. 83, no. 11, Mar. 15, 1924, pp. 515-518, 4 figs. Factors which led Southern Cal. Edison Co. to operate at this tension; line insulation; handling charging current and flashovers; new bus design; switching problem.

Underground. See CABLES, ELECTRIC, Underground.

Vector Diagrams for. Vector Diagrams for Long Lines, E. A. Loew. Elec. World, vol. 83, no. 10, Mar. 8, 1924, pp. 477-480, 3 figs. Graphical solution for transmission problems which is both accurate and easy to comprehend; gives current, voltage, power factor, power regulation, etc., for line of any length with or without phase control.

Voltage Drop. The Voltage Drop in a Three-Phase Transmission Line with Unsymmetrically Arranged Conductors, H. Cotton. World Power, vol. 1, no. 4, Apr. 1924, pp. 211-215, 5 figs. Calculation of drop due to resistance and inductance.

Voltage Regulation. Exact Calculation of the Voltage Regulation of Long-Distance Power Transmission Lines (Exakt beräkning av spänningsregleringen hos långa kraftledningar), E. Velander. Teknisk Tidskrift, vol. 54, no. 40, Oct. 4, 1924, pp. 166-171 (Elektroteknik), 13 figs. Theoretical solutions of problems involved, tables, diagrams, and comparisons with other methods of exact calculation of said regulation.

Regulator Settings for Long Lines, L. F. Woodruff. Elec. Wld., vol. 84, nos. 9 and 10, Aug. 30, and Sept. 6, 1924, pp. 411-412 and 460-464, 6 figs. Automatic voltage regulator can be used to arrive at desired operating characteristics. Describes use of power-circle diagrams, theory of performance, example of application, and analysis of requirements.

See also VOLTAGE REGULATION.

Voltage Surges Recording Instrument. A New Instrument for Recording Voltage Surges on Transmission Lines. Coal Trade Bul., vol. 50, no. 11, May 1, 1924, pp. 483-484, 7 figs. See also Universal Engr., vol. 40, no. 5, Nov. 1924, pp. 29-30, 7 figs. Describes instrument known as Klydonograph, developed by J. F. Peters of Westinghouse Elec. & Mfg. Co., with which graphic record of voltage surges of extremely short duration can be obtained, giving their polarity, magnitude, steepness of application, etc.

Klydonograph Records Voltage Surges on Transmission Lines. Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 728-729, 4 figs. Instrument developed by J. F. Peters, of Westinghouse Elec. & Mfg. Co., is simple device for recording abnormal voltages.

Wave Propagation. Velocity of Propagation of Migratory Waves in Electric Lines (Die Fortpflanzungsgeschwindigkeit der Wanderwellen in elektrischen Leitungen), H. Fassbender. Archiv für Elektrotechnik, vol. 13, no. 5, Aug. 22, 1924, pp. 392-395, 2 figs. Method by means of which high-frequency migratory waves may also be proved in low-voltage lines.

Waves. Waves of Rigid Front (Ondes à front raide), P. Bunet. Industrie Electrique, vol. 33, no. 777, Nov. 10, 1924, pp. 447-453, 7 figs. Discusses theory and form of rigid and parasitic waves and their action along line.

Wooden Poles for Long Spans. Wooden Pole Towers for Long-Span Construction, K. B. Ayers. Elec. Wld., vol. 83, no. 3, July 19, 1924, pp. 114-115, 3 figs. Details of installation of two spans more than 3000 ft. long. How installation was made. Steel wires used.

ELECTRIC WAVES

Biologic Action of Radiation. Biologic Action of Electric Waves (Rayonnements microbiens et oscillation cellulaire), Geo. Lakhovsky. Radioélectricité, vol. 5, no. 7, Oct. 25, 1924, pp. 397-399, 2 figs. Author has found that electric waves of very high frequency affect in unmistakable way the life of microörganisms such as microbes; number of systematic tests have proved author's theories; results of experiments on plants inoculated with tumor-producing bacteria; author maintains that his method may ultimately be perfected to act in similar way on certain bacteriological diseases of animal and human body.

ELECTRIC WELDING

Boiler Construction and Repair. Electric Welding for Boiler Construction and Repairs. Eng. &

Boiler House Rev., vol. 37, no. 7, Feb. 1924, pp. 238-240, 2 figs. Extent to which electric welding is applicable to boilers of all types; information regarding work already carried out.

See also AUTOGENOUS WELDING, Boilers.

Boiler Tubes. The Repair of Boiler Tubes by Electric Welding (Réparation des tubes à fumée), Renaud. Revue Générale des Chemins de Fer & des Tramways, vol. 43, no. 5, May 1924, pp. 341-347, 7 figs. Methods and machinery employed at shops of Sotteville-les-Rouen, France.

Dynamo for. Development of Electric Welding Dynamo (Die Entwicklung der Schweissdynamo). Elektrotechnischer Anzeiger, vol. 41, no. 122-123, July 31, 1924, p. 650. Details of design and operation of dynamo for producing alternating current for welding in place of direct current.

Machines. The A. I. Electric Welders. Engineering, vol. 118, nos. 3075 and 3077, Dec. 5 and 19, 1924, pp. 764-765 and 827-829, 14 figs. Describes electric welder for stator windings, and types of spot, butt, and seam welders manufactured by A. I. Elec. Welding Appliances Co., London.

Oil Tanks. Electric Welding of Large Storage Tanks, H. C. Price. Am. Inst. Min. & Met. Engrs. —Trans., no. 1345-P, June 1924, 11 pp., 12 figs. Describes construction of welded roofs and bottoms and gives their advantages over riveted construction; data and conclusions obtained from observations made during welding of tanks by Welding Eng. Co., Texas City, Tex., and Tonkawa and Burbank, Okla.

Electrically Welded Repairs to Oil Storage Tank Bottoms, L. F. Champion. Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 493-494, 1 fig. Description of work in placing welded bottom in 55,000-bbl. tank of Pac. Oil Co.

Precision. One More Step in Electric Welding Progress, S. W. Mann. Am. Welding Soc.—Jl., vol. 3, no. 1, Jan. 1924, pp. 18-23, 2 figs. Discusses precision welding, describing process of repairing a crankshaft, which was accomplished at very great saving.

Resistance. See ELECTRIC WELDING, RESISTANCE.

Spot. See ELECTRIC WELDING, RESISTANCE, Spot.

Types and Applications. Modern Welding (Neuzeitliches Schweissen), H. Neese. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 636-638, 7 figs. Types of welding, use of welding wire, types of butt and lap welding and riveting plates; results of welding tests.

ELECTRIC WELDING, ARC

Alternating-Current. Electric Welding with A. C. Arc (Die elektrische Schweissung mit dem Wechselstrom-Lichtbogen), F. Wörtmann. Elektrischer Betrieb, vol. 22, no. 9, May 10, 1924, pp. 73-77, 12 figs. Investigations carried out in laboratory for electric plants and railways of Technical High School of Hanover.

Electric Welding With A. C. Arc (Die elektrische Schweissung mit dem Wechselstromlichtbogen), Franz. Dinglers Polytechnisches Jl., vol. 339, no. 22, Nov. 1924, pp. 224-225. Advantages of a.c. welding and how to overcome its drawbacks.

Cast Iron. Arc Welding Cast Iron. Welding Engr., vol. 9, no. 4, Apr. 1924, pp. 22-23, 3 figs. How to use monel-metal electrode.

Castings. Arc Welding of Castings (Lichtbogenschweissung von Gussstücken), Achenbach. Giesserei-Zeitung, vol. 21, no. 19, Oct. 1, 1924, pp. 417-422 and (discussion) 422-423, 12 figs. See also Wärme, vol. 47, no. 43, Oct. 24, 1924, pp. 507-512, 12 figs. Influence of Si, Mn, C, P, S and O on welding; heat conditions; changes of structure; different welding methods.

Copper. Summary of Information on Arc Welding of Copper, Brass and Bronze in the Literature Up to March, 1923. Am. Welding Soc.—Jl., vol. 3, no. 3, Mar. 1924, pp. 9-15. Digest of literature made by subcommittee of Electric Arc Welding Committee of Am. Bur. Welding.

Direct-Current. Electric Direct-Current Arc Welding (Elektrische Gleichstrom-Lichtbogenschweissung), G. Hafergut. Elektrotechnik u. Maschinenbau, vol. 42, no. 26, June 29, 1924, pp. 178-180, 8 figs. Gives examples of application including work on station, transformers, machines, etc.

Galvanized Tanks. The Sheathed Electrode and An Example of Its Application to the Automatic Welding of Galvanized Tanks, B. C. Tracey. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 772-773, 3 figs. Outstanding features of sheathed electrode. Describes welding of galvanized iron tank by use of automatic arc-welding machine; savings effected by electric welding.

Gate-Valve Reclamation. An Interesting Arc Welding Operation. West. Machy. Wld., vol. 15, no. 4, Apr. 1924, pp. 125-126, 2 figs. Methods used by ReQua-Weart Co. of San Francisco, in reclamation of a 48-in. gate valve for a Nevada power company.

Heavy Plate. Arc Welding Heavy Plate, H. P. Eagan. Welding Engr., vol. 9, no. 9, Sept. 1924, pp. 20-21, 3 figs. Arc welding of heavy plate can be successfully done if correct methods are used; three fundamental principles must be followed.

Locomotive Repairs. Electric Arc Welding on the Steam Locomotive, W. W. M. Brady. Gen. Elec. Rev., vol. 27, no. 10, Oct. 1924, pp. 687-697, 26 figs. Superior economy and utility of electric arc welding for quickly making reliable repairs and building up worn surfaces.

Low-Carbon Steel. Electric Welding (Ueber elektrische Schweissung), H. Neese. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 43, Oct. 25, 1924, pp. 1125-1132, 19 figs. Notes on arc welding of low-carbon steel. Metallurgy of low-carbon-steel welding; chemical composition and structure; influence of strength of current; strength of different welds; experimental results of welds with d.c. and a.c.; performance tests; useful possibilities of welding and costs.

Manganese Steel. Correct Welding Procedure Retains Qualities of Manganese Steel, H. H. George. Elec. Ry. Jl., vol. 63, no. 16, Apr. 19, 1924, pp. 611-613. By use of arc welding in the field, life of manganese steel special work can be increased one to five years. Type of welding rod, technique employed, and speed of cooling affect physical characteristics of welded material.

Motor-Generator Sets. See MOTOR-GENERATORS, Arc-Welding.

Oil-Well Casings. See OIL WELLS, Casings, Welding.

Optical Projection of. Optical Projection of Arc Welding, F. Davis. Am. Welding Soc.—Jl., vol. 3, no. 11, Nov. 1924, pp. 18-20, 2 figs. Describes machine built in order to more clearly bring out details of arc welding and to make it possible for large audience to witness a demonstration; used in connection with any stereopticon or moving-picture screen, only other apparatus needed being outfit for semi-automatic welding or hand welding.

Precision. Precision Welding, S. W. Mann. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 57-60, 3 figs. Describes process and method of repairing crankshaft known as neutralized precision weld.

The Electric Arc in Precision Welding, S. W. Mann. Forging-Stamping-Heat Treating, vol. 10, no. 2, Feb. 1924, pp. 68-71, 3 figs. Flexibility of electric arc welding makes it possible to repair a broken shaft or casting to same degree of strength and accuracy as before failure.

Problems and Uses. Electric Arc Welding (Aus der Werkstatt des Lichtbogenschweissers), A. Hochstimm. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 6, Feb. 9, 1924, pp. 129-132, 18 figs. Discusses useful field of arc welding; peculiarities of d.c. and a.c. arc welding; training of welders; and results obtained.

Rail Bonds. How a Copper-to-Steel Bond Is Made, with Tests Proving Its Efficiency and Endurance, J. B. Austin. Coal Age, vol. 26, no. 10, Sept. 4, 1924, pp. 330-334, 8 figs. Describes process for directly welding all-copper bond terminals to rail with copper, providing high electrical conductivity; mold confines heat to terminal while bond is being formed; copper sleeve protects strands of cable against breakage.

Rail Joints. Improvements in Arc-Welded Rail Joints, R. B. Fehr. Elec. Ry. Jl., vol. 63, no. 20, May 17, 1924, pp. 783-785. Recent developments in method of welding joint plates by means of carbon arc process, and tests on several types of joints.

Rail Welding in Connecticut. Elec. Ry. Jl., vol. 63, no. 14, Apr. 5, 1924, pp. 537-539, 2 figs. Improvements in carbon arc welded rail joints adopted by Connecticut Co.; tilted joint plate and base plate adapted to 23 different rail sections; precautions adopted to secure good welds.

Safety Precautions. Using the Arc With Safety, D. H. Devoe. Welding Engr., vol. 9, no. 7, July 1924, pp. 28-29. Methods of protecting eyes and bodies of electric arc welding operators; safeguarding apparatus.

Sheet-Metal Parts. Arc Welding Sheet-Metal Parts, A. R. Luechinger. Am. Mach., vol. 60, no. 12, Mar. 20, 1924, pp. 425-427, 6 figs. What constitutes good welding; proper methods of welding different kinds of seams; how operators should be trained; use of fixtures in production welding.

Ship Construction. Applications of Arc Welding to Ship Construction, E. H. Ewertz. Mar. Eng. & Shipg. Age, vol. 29, nos. 1 and 2, Jan. and Feb. 1924, pp. 47-54 and 114-121 and 124, 4 figs. Jan.: Results of tests to determine strength of welded joints; attitude of classification societies toward application of electric welding. Feb.: Lloyd's rules and regulations for application of electric arc welding to ship construction; corrosion; bibliography.

Metal Arc Welded Ships, J. W. Owens. Welding Engr., vol. 9, no. 8, Aug. 1924, pp. 19-22 and 24, 6 figs. Residual stress and other fundamentals in design of metal arc-welded ships and welded structures in general.

Residual Stress and Other Fundamentals in the Design of Metal Arc Welded Ships and Welded Structures in General, J. W. Owens. Mar. Eng. & Shipg. Age, vol. 29, no. 8, Aug. 1924, pp. 487-491, 6 figs. Discusses selection of joints, value of residual stress in joint, form of welding, carbon content of base metal, dangerous types of joint in ship structures, mechanical properties of joint, ease of assembly, butt joints and facility of welding.

Structural Steel. Use of Electric Arc for Welding Structural Steel, R. E. Kinkead. Am. Welding Soc.—Jl., vol. 3, no. 10, Oct. 1924, pp. 20-23. Considers fundamentals which enter into problem of determining what makes a perfect rivet work loose; reasons why rivets are not perfect; limitations of welded joint.

Welding as a Method of Fabricating Large Structures, H. Goldmark, W. Spraragen and W. L. Warner. Am. Welding Soc.—Jl., vol. 3, no. 10, Oct. 1924, pp. 27-69, 25 figs. Welding versus riveting in structural work; use of welding as a substitute method for fabrication; results of English tests; results obtained on a large steel box for Electric Welding Committee of Emergency Fleet Corpn.; tests on arc welded roof truss; shearing strength of welds; joints specifically designed for welding; welding of lockgates and caissons; cost data; examples of welded structures; corrosion. Appendices containing following papers: Design for a Riveted Steel Truss for Static Loads, E. P. McKibben, and Welded Truss, W. L. Warner.

Systems. "Electrical System of Welding," C. N. O. Dutton. So. African Inst. Elec. Engrs.—Trans., vol. 15, part 4, Apr. 1924, pp. 364-374, 18 figs. Gives short description illustrating the advantages for metals to be welded or treated by Bernados system, metallic arc system, spot and butt welding, and metallic tipping or depositing by electric arc.

Theory. Theoretical Considerations on Electric Arc Welding (Considérations théoriques sur la soudure électrique à l'arc), M. Lebrun. Revue de Métallurgie, vol. 21, no. 8, Aug. 1924, pp. 484-495, 20 figs. Electric characteristics of a welding arc; effect of kind of current and of covering of electrodes; characteristics of electrodes.

Uses. Arc Welder and Its Uses. Welding Engr., vol. 9, no. 8, Aug. 1924, pp. 28-29. Electrical circuit; electric arc; utility for welding purposes; electrodes for arc welding.

Welders, Training of. Training Course for Electric Arc Welders. Am. Welding Soc.—Jl., vol. 3, no. 2, Feb. 1924, pp. 15-47. Analysis of work of an arc welder; qualifications for welders; some of the fundamentals in arc welding; together with a detailed statement of material classified under type welding jobs arranged in order of difficulty from standpoint of teaching.

ELECTRIC WELDING, RESISTANCE

Application. See OXY-ACETYLENE WELDING, Application.

Machines and Processes. Recent Developments of Electric Welding Machines (Die neuere Entwicklung der elektrischen Schweissmaschinen), A. Neuburger. Elektrotechnik u. Maschinenbau, vol. 42, nos. 14 and 15, Apr. 6 and 13, 1924, pp. 214-219 and 230-235, 20 figs. Description of modern processes and machines, with special reference to resistance welding.

Seam Welders. Various Types of Electric Seam Welders, J. R. Brueckner. Forging—Stamping—Heat Treating, vol. 10, no. 3, Mar. 1924, pp. 107-109. Discusses development of automatic spot welder, continuous seam welder, roll-step method of seam welding, and seam welding using interrupted current, and merits of each method.

Spot. A Krupp Spot Welding Machine (Eine Kruppsche Punktschweissmaschine), J. Pfretzschner. Kruppsche Monatshefte, vol. 5, July 1924, pp. 122-126, 7 figs. Details of an electric spot-welding machine using Krupp non-rusting steel, and its many applications.

Electric Spot Welding (Rückwirking des Schweissgutes auf die Strom- und Spannungsverhältnisse der Punktschweissmaschine), F. H. Hellmuth. Elektrotechnische Zeit., vol. 45, no. 25, June 19, 1924, pp. 657-658, 3 figs. Inductive effect upon circuit of metal object to be welded is studied by means of vector diagrams; investigation reveals presence of additional flux, magnitude and phase of which are determined; from this, explanation is given of apparently irregular

behavior of cos ϕ between supply voltage and supply current on short circuit.

Electric Spot Welding Aluminum or Duralumin, J. W. Meadowcroft. Am. Welding Soc.—Jl., vol. 3, no. 9, Sept. 1924, pp. 10-11. Author finds that best results are obtained by using steel as resistance material and by interposing superposed pieces of aluminum or duralumin between sheets of steel.

Spot Welding, G. A. Hughes. Iron & Steel Engr., vol. 1, no. 11, Nov. 1924, pp. 597-604, 15 figs. Reviews various forms of electric welding for riveting of steel plates.

Spot Welding, W. Remington. Am. Welding Soc.—Jl., vol. 3, no. 9, Sept. 1924, pp. 23-26. Report of the resistance welding committee of Am. Bur. Welding.

Spot Welding for Pressed Steel Parts, R. Trautschold. Forging—Stamping—Heat Treating, vol. 10, no. 7, July 1924, pp. 265-266. Discusses reasons for employing a.c. supply, contact points and control of temperature distribution area, preparation of stock for spot welding, deep depression welding, and seam welding. Is a practical and highly efficient method of joining light metal parts.

Uses of Spot Welding in the Structural Field, H. A. Woofter. Am. Welding Soc.—Jl., vol. 3, no. 10, Oct. 1924, pp. 11-19, 14 figs. Results of tests; different applications; principal reasons why spot welding formerly had not been employed in large structural work such as steel building frames, bridges and ships.

ELECTRIC WIRING

Conduit Threading Machine. Conduit Threading Machines. Iron Age, vol. 113, no. 26, June 26, 1924, p. 1855, 3 figs. Both ends of 2400 ten-foot lengths or 4800 ends of ½-in. material threaded per hour in machine called Roto-Matic.

Use of Bare Neutral is Suggested. Elec. News, vol. 33, no. 2, Jan. 15, 1924, pp. 37-38, 1 fig. Describes proposed system of conduit wiring placed before Hydro-Elec. Power Commission of Ontario; employs bare neutral in three wire circuits; advantages and comparative merits claimed for it.

Fire Hazard. Electrical Wiring and Fire Damage. Am. Architect, vol. 125, no. 2437, Jan. 16, 1924, pp. 69-73, 11 figs. Suggestions for reducing fires due to defective wiring; actual cost of knob and tube, and armored cable types of wiring.

ELECTRICAL APPARATUS

Developments. Review of Developments in Electrical Apparatus. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 649-652, 8 figs. (Abstract.) 1924 report of Electrical Apparatus Committee of Nat. Elec. Light Assn.

Stationary, Altitude Effects. Temperature Rise of Stationary Electrical Apparatus as Influenced by Radiation, Convection and Altitude, V. M. Montsinger and W. H. Cooney. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 803-812, 9 figs. Discusses temperature rise of various shaped surfaces as influenced by radiation and free convection for a given altitude, giving results of tests made on a large plate to determine formula for free convection, also results of tests and discussion on effect of different colored cases on temperature rise of transformers in shade and sunshine; and effect of altitude on temperature rise of transformers having different shapes of tank surfaces, of rheostats, bus bars, reactors, etc.

ELECTRICAL EQUIPMENT

British Empire Exhibition. Electrical Material. Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 541-546, 14 figs., partly on supp. plates. Describes 30,000-hp. twin-wheel impulse turbines for Behira power station of Tata Co. in India, and 25,000-hp. reaction turbine for South America; constructed by English Elec. Co.; also describes some of smaller electrical exhibits, including photometer, switchgear, telephone apparatus, etc., at Brit. Empire Exhibition.

Electrical Plant at Wembley. Electrician, vol. 92, no. 2393, Mar. 28, 1924, pp. 390-396, 12 figs. Preliminary survey of electrical exhibits at British Empire Exhibition, Wembley, Eng.; biggest display on record of work of British manufacturers.

Development, 1923. Electrical Developments During 1923. Iron Age, vol. 113, no. 3, Jan. 17, 1924, pp. 223-224. Increased size of units a feature; transportation problems; high-pressure turbines mark progress.

Recent Electrical Equipment, A. J. Whitcomb. Indus. Engr., vol. 82, no. 2, Feb. 1924, pp. 69-80 and 104-106, 18 figs. Describes new equipment for industrial use brought out during 1923, with new applications of standard types of particular interest to men responsible for plant operation from production and maintenance standpoints, including industrial motors and motor drives, electric control equipment, substation equipment, industrial, heating, and repair shop tools and supplies.

French Exposition. Electrical Exhibits at the Exposition of Physics and Radiotelegraphy (L'électricité à l'Exposition de Physique et de T. S. F.), A. Curchod. Serial article in Revue Générale de l'Electricité, vol. 15, beginning Feb. 9 and ending June 28, 1924. Feb. 9: Equipment for installations of very high tension. Feb. 16: Wires and cables. Feb. 23: Electrical apparatus: circuit breakers, switches, controlling and regulating devices. Mar. 1: Cells and storage batteries. Mar. 8: Non-electrical equipment for electric generating stations, such as boilers and furnaces, compressors, boiler accessories, etc. Mar. 15: Electrotechnical materials, such as electrolytic iron, magnetic steel, insulating materials. Mar. 22: Generating machines and transformers, such as commutators, converters, and generators, and different types of rectifiers. Mar. 29: Transmission-line equipment. Apr. 5: Electric motors. Apr. 12: Appliances for different mechanical applications, such as railway signaling, etc. Apr. 19: Telegraphic equipment. Apr. 26: Telephonic equipment. May 3: Domestic electrical appliances. May 10: Electric lighting: arc and incandescent lamps; reflectors and projectors; mercury-arc lamps. May 17: Electrotherapeutic apparatus. May 24: Electric heating and welding equipment; electrometallurgical and electrochemical products. May 31: Measuring instruments. June 7: Experimental devices; research and demonstrating apparatus. June 21: Receiving radioelectric waves, sending apparatus, three electrode lamps, radioelectric accessories. June 28: Laboratories, schools, books, and reviews.

Improvements, 1923. Electrical Engineering in 1923. Engineer, vol. 137, no. 3549, June 4, 1924, pp. 20-22, 6 figs. on supp. plate. Developments in turbogenerators; converting plant; mercury vapor rectifiers; switchgear; electric-railway equipment; electricity in mines; rolling mills; motors; wireless communication.

Leipzig Fair. Electrical Exhibits at the Leipzig Spring Fair 1924 (Die Elektrotechnik auf der Leipziger Frühjahrsmesse 1924), W. Kraska. Elektrotechnische Zeit., vol. 45, no. 15, Apr. 10, 1924, pp. 321-329, 35 figs. Electrical machinery; drives; apparatus; installation materials; heating; lighting; measuring instruments; wiring; insulating material and insulators; weak-current installations; radiotelegraphy.

Maintenance. Modern Maintenance of Plant and Equipment, Wm. G. Ziegler. Indus. Mgmt. (N. Y.), vol. 67, no. 4, Apr. 1924, pp. 224-229, 5 figs. Maintenance of electric power and heating equipment.

Maintenance Shop Practice. Discussion: Developments in Electric Maintenance Shop Practice. Iron & Steel Engr., vol. 1, no. 11, Nov. 1924, pp. 579-596 and 605. Discussion of armature repair practice; shafts, journals and keyways; commutators, bearings, coils, winding practice, controllers; shop cleaning, etc.

Protection. Protection of Electrical Equipment, V. H. Todd. Power Plant Eng., vol. 28, nos. 4, 7 and 9, Feb. 15, Apr. 1, and May 1, 1924, pp. 235-238, 12 figs., 384-387, 7 figs., and 452-454, 4 figs. Feb. 15: Protection of transformers against heating overloads, internal shorts and static stresses. Apr. 1: Protection of apparatus from line disturbances. May 1: Protection of electric motors.

Zinc Plant. Electric Equipment, Consolidated Mining and Smelting Company's Zinc Plant, Trail, B. C., Canada, R. N. Lockyer. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 531-544, 25 figs. Power supply; electrical equipment in distributing station; generator rooms; motor-generator sets; ventilation; switchboards; load characteristics; air compressors; industrial motors; water supply.

ELECTRICAL INDUSTRY

Czechoslovakia. Electric Industry, Power and Radio in Czechoslovakia (Elektroindustrie, Energiewirtschaft und Funkwesen in der Tschechoslowakei), Elektrotechnische Zeit., vol. 45, no. 45, Nov. 6, 1924, pp. 1208-1212, 2 figs. Discusses existing and projected hydroelectric and central heating plants, electrification of railways and industries, use of wind power, radiotelephony and radiotelegraphy, and formation of a German Electrotechnical Association.

Developments in 1923. Some Developments in the Electrical Industry During 1923, J. Liston. Gen. Elec. Rev., vol. 27, no. 1, Jan. 1924, pp. 9-60, 94 figs. See also Nat. Elec. Light Assn.—Bul., vol. 11, no. 1, Jan. 1924, pp. 13-19. Includes turbines and supercharger, electric propulsion, electric railways, automatic stations, water-wheel generators, frequency converters, industrial motors and their control, motor applications, steel mills, electric welding, induction furnaces, industrial heating, battery chargers, transformers, induction voltage regulators, lightning generator, lightning arresters, reactors, X-ray tubes, photo-electric cell, conductor cable, high-voltage d.c. cable testing sets, electrically-operated flow meters, radio, carrier current, switching apparatus, and lighting.

Germany. German Electrical Industry, A. J. Gray. Trade Information Bul. (Supp. to Commerce Reports), no. 187, Feb. 11, 1924, 16 pp. Observations at Leipzig Fall Fair of 1923.

Poland. Poland Building an Electrical Industry. Elec. Wld., vol. 84, no. 13, Sept. 27, 1924, pp. 675-677, 1 fig. Many projects for erecting generating stations, both steam and hydro; developments in manufacturing; electrifying industry and railways; foreign capital being invested, with government going into partnership.

Russia. Electrification Schemes in Russia, B. L. Metcalf and O. Morduch. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 932-935, 4 figs. Discusses importance of foreign markets for electrical industry of Great Britain and characteristics of Russia as prospective market for electrical goods; possibilities of electrification in Russia, and projects of various electrification schemes; results achieved and work done.

ELECTRICAL MACHINERY

A. C. Windings, Losses in. Eddy Losses in Alternating-Current Windings in Electrical Machinery (Tillsatsförluster i växelströmslindningar i maskiner), J. Wennerberg. Teknisk Tidskrift, vol. 54, nos. 23 and 27, June 7 and July 5, 1924, pp. 110-112 and 120-124 (Electroteknik), 9 figs. Approximate method for determination of eddy losses, occurring in copper conductors of alternating-current machinery, due to magnetic induction of leakage fields in armature slots.

Ball and Roller Bearings for. See BEARINGS, BALL, Electrical Machinery.

Breakdowns, Protection from. How to Minimize Breakdowns of Electrical Machinery, C. H. S. Tupholme. Coal Age, vol. 25, no. 1, Jan. 3, 1924, pp. 5-6. Importance of cleanliness and regular lubrication; bearings should be kept cool and renewed promptly.

British Empire Exhibition. Electrical Engineering Exhibits. Engineer, vol. 137, nos. 3568, 3569, and 3570, May 16, 23, and 30, 1924, pp. 533-536, 11 figs., 558-563, 13 figs, and 589-591, 6 figs. May 16: Exhibits of English Elec. Co. at Brit. Empire Exhibition, including 3-phase 50-cycle transformer and 2000-kw. electric transverter. May 23: Exhibits by Electromotors, Mather & Platt, Brit. Elec. Transformer Co., and Brit. Lighting & Ignition Co. (Vickers), includes description of 1875-kva. single-phase transformer. May 30: 12,000-kw. tandem turbo-generator exhibited by C. A. Parsons & Co. at Brit. Empire Exhibition; transformers exhibited by Brush Elec. Eng. Co.; other exhibits.

Brown-Boveri. Progress in Brown Boveri Design During Recent Years, K. Sachs and P. Faber. Brown Boveri Rev., vol. 11, no. 8, Aug. 1924, pp. 147-187, 84 figs. Discusses electrical machinery and apparatus, induction motors, direct-current machines, transformers, mercury-arc power rectifiers, high-tension switchgear, electrical apparatus, selective protection and electric furnaces.

Calculation. Operating Resistances in Direct-Current Series Machines with Frequent Starting and Stopping (Widerstandauslegungen für im scharf aussetzenden Betriebe arbeitende Gleichstrom-Hauptschlussmaschinen), H. Winkler. Elektrotechnische Zeit., vol. 45, no. 28, July 10, 1924, pp. 737-740, 7 figs. Discusses simple method of calculating proper ohm values, especially of braking resistances, and shows unsuitability of present method.

Design. Dynamo and Motor Design, F. Creedy. Electrician, vol. 93, no. 2415, 2416, and 2418, Aug. 29, Sept. 5 and 19, 1924, pp. 226-228, 252-253, and 312-313, 10 figs. Recent developments in electrical machinery.

Engine Stop Failures. Methods of Averting Engine Stop Failures, W. Greenwood. Power House, vol. 17, no. 13, July 5, 1924, pp. 32-34 and 46, 2 figs. Proper construction, installation and operation practically insure reliability of control equipment in power house; standardization advocated as important factor.

Frequency Changes. Effect of Frequency Changes on Electric Machines and Apparatus, H. Maruyama and S. Momota. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 435, Oct. 1924, pp. 901-912. How characteristics of machines will change by changes of cycles and whether they can be remodeled to suit changed frequency; treats these two problems on alternator, induction motor and transformer; gives probable figures when 60-cycle machines are operated at 55 and 50 cycles and also 50-cycle machines when operated at 55 and 60 cycles. (In Japanese.)

Grounding. Grounding of Electric Machinery, W. Hilleary. Power, vol. 59, no. 23, June 3,

1924, pp. 905-906. Discusses grounding of electrical-equipment frames, including motors, dynamos, transformers, and other equipment.

How to Ground Electrical Mining Machinery, Chas. M. Means. Coal Age, vol. 25, no. 26, June 26, 1924, pp. 947-948. Ground connection should be given same care as feeders; stops on heavily sanded rail should be avoided; surges make alternating current dangerous.

The Grounding of Electrical Mining Machinery, C. M. Means. Coal Trade Bul, vol. 51, no. 3, July 1, 1924, pp. 123-124. All safety rules require grounding frames, bed plates and all metallic non-current carrying parts of stationary electrical equipment and underground equipment. Rules for grounding should be strictly adhered to for all power equipment regardless of voltage of circuit to which such equipment is connected.

Influence and Electromagnetic Machines. Analogy Between Electromagnetic Machines and Influence Machines (Die Analogie zwischen elektromagnetischen Maschinen und Influenzmaschinen), F. Ollendorff. Elektrotechnische Zeit., vol. 45, no. 11, Mar. 13, 1924, pp. 210-213, 4 figs. Refers to work by author published in Archiv für Elektrotechnik on influence machines, and compares laws developed therein with well-known laws governing electromagnetic machines, showing close relationship between these two groups; discusses properties of influence transformers, synchronous and commutator machines.

Installation. Preparing Electrical Machinery for Installation. Power Plant Eng., vol. 28, no. 20, Oct. 15, 1924, p. 1062. Extracts from instruction book of Elec. Power Club, containing valuable suggestions.

Insulating Materials for. See INSULATING MATERIALS, ELECTRIC, Electrical Machinery.

Iron Losses. Measuring Iron Losses by a Bridge Method (Eisenverlustmessungen nach einer Brückenmethode), J. Goldstein. Elektrotechnische Zeit., vol. 45, no. 47, Nov. 20, 1924, pp. 1270-1272, 4 figs. Examines a bridge connection proposed by Biermann for measuring iron losses. Develops formulas for calculation.

Pole Cores, Excitation of Non-Salient. Excitation of Non-Salient Pole Cores, N. B. Hill. Electricien, vol. 92, no. 2381, Jan. 4, 1924, pp. 6-7, 4 figs. A method of estimating requirements in special cases.

Protection. Some Aspects of Protective Apparatus for Electrical Machinery, C. J. Monk and N. D. Penney. S. African Inst. Elec. Engrs.—Trans., vol. 15, part 7, July 1924, pp. 415-426 and (discussion), 426-429, 5 figs. See also (discussion), by V. Pickles, in part 8, Aug. 1924, pp. 439-442. Improvements in protection, and reasons for further improvements; directions in which it is possible to effect improvements; faults between phases; failure of d.c. supply; faults to earth on stator; functions of protective relays.

Pulsations in Power. Pulsations in Power Due to Synchronous Motor Driven Compressors, Q. Graham. Elec. Jl., vol. 21, no. 2, Feb. 1924, pp. 70-71, 5 figs. Discusses causes of pulsations of power which result from use of synchronous motors with reciprocating compressors, or similar machinery, and its effects.

Regulation, Automatic. Automatic Regulation of the Power of an Electric Plant (Sur le réglage automatique de la puissance d'une installation électrique), M. Doloukhanoff. Académie des Sciences—Comptes Rendus, vol. 179, no. 22, Dec. 1, 1924, pp. 1260-1263. Particulars of a method of grouping machines by mathematical combination and putting these groups into service so that at any moment power produced is practically equal to demand.

Regulations, German. Most Important Changes in the Association Rules Regarding Machinery and Transformers (Ueber die wichtigsten Aenderungen der Verbandsbestimmungen betreffend Maschinen und Transformatoren), G. Dettmar. Elektrische Betrieb, vol. 22, no. 19, Oct. 10, 1924, pp. 193-197. Development of "Rules for Testing Electric Machinery" by Verband Deutscher Elektrotechniker (V. D. E.) and their latest re-drafting.

Rotating-Armature Temperature Measurement. The Measurement of Temperature in a Rotating Armature by Means of Thermocouples, B. G. Churcher. Jl. Sci. Instruments, vol. 1, no. 10, July 1924, pp. 310-314, 1 fig. Describes measurement by means of thermocouples of rate of change of temperature of a conductor mounted in a slot of a rotating armature, which was found necessary in course of an investigation on energy loss arising from eddy currents flowing in armature conductors of electrical machines.

Rotating, Tooth Pulsation in. Tooth Pulsation in Rotating Machines, T. Spooner. A. I. E. E.—Jl., vol. 43, no. 7, July 1924, pp. 646-650, 12 figs. Presents experimental method of checking magnitude of flux pulsations in teeth of rotating machines where both members are slotted. Test results compared with pulsation amplitudes as calculated by two methods.

Shaft Dimensions. Dimensioning Shafts for Electric Machinery (Die Bemessung der Wellen elektrischer Maschinen), E. Lasswitz. Elektrotechnische Zeit., vol. 45, no. 45, Nov. 6, 1924, pp. 1205-1208, 4 figs. Discusses determination of shafts with reference to deflection and critical number of revolutions, with special reference to wear of bearings, resulting one-sided magnetic pull, etc., by means of alignment charts.

Shaft Whipping. Shaft Whipping, B. L. Newkirk. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 169-178, 13 figs. Analysis of vibrations and shaft whipping and means and ways of prevention.

Speed Determination. Photographic Method of Determining Machine Speeds, R. F. Mundorff. Machy. (N. Y.), vol. 30, no. 10, June 1924, p. 782, 1 fig. See also Machy. (Lond.), vol. 24, no. 609, May 29, 1924, p. 271, 1 fig. Method of determining retardation of machine speeds which eliminates personal equation and possibility of error that exists when successive speed readings are taken in usual way.

Standardization. Electrical Machinery Committee. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 974-978. Committee consideration of standardization matters in their initial stages; service conditions; application recommendations.

Standards. New Text of V. D. E. Regulations for Erection and Operation (Die neue Fassung der Errichtungs- und Betriebsvorschriften des V. D. E.), G. Dettmar. Elektrische Betrieb, vol. 22, no. 20, Oct. 24, 1924, pp. 212-213. Main changes relating to grounding, distinguishing third wire in three-phase systems, cooling of machines and transformers, switching and distributing plants, high-tension insulation, etc.

Practical Application of Standards in the A. E. G. (Die praktische Durchführung der Normen in der AEG.), E. Lasswitz. Fördertechnik u. Frachtverkehr, vol. 17, no. 12, June 18, 1924, pp. 162-166, 11 figs. Explains introduction of standards in A. E. G. factories and savings effected.

Temperature Indicators. Switchboard Type Temperature Indicators, D. M. Carswell. Gen. Elec. Rev., vol. 27, no. 7, July 1924, pp. 425-429, 10 figs. Describes equipments for a.c. generators and motors, thermocouple indicator equipment, and equipment for transformer windings.

Temperature Measurement. Measuring Temperature in Electric Machinery, I. M. Stein. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1209-1211, 2 figs. Modern methods.

Temperature Rise and Distribution. The Rise and Distribution of Temperature in Small Electrical Machines, E. Hughes. Instn. Elec. Engrs.—Jl., vol. 62, no. 331, July 1924, pp. 628-648, 21 figs. Factors influencing shape of heating and cooling curves of coils and electrical machines. Calculation of thermal conductivity of insulation; effects of different temperature-rises and different air velocities upon thermal conductivity and temperature-rise per watt. New arrangement for measuring mean temperature-rise of field windings. Deduces temperature-rise of field windings in terms involving speed and armature loss for different machines, and compares temperature-rise as measured by resistance and by thermometer.

Testing. Making Electrical-Machinery Tests in Industrial Plants, J. E. Housley. Power, vol. 60, no. 23, Dec. 2, 1924, pp. 890-891, 1 fig. Reasons for making tests; examples of conditions discovered by tests; forms on which to record motor-test data; selection of instruments best suited to making tests.

Testing of Electric Machines (Die Prüfung elektrischer Maschinen), F. Hillebrand. Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1124-1127, 5 figs. Testing after finishing machines; determination and elimination of electrical and mechanical defects, noting possible improvements; testing laboratory and equipment.

Ventilation. Ventilating Electrical Machinery. Iron Trade Rev., vol. 75, no. 22, Nov. 27, 1924, pp. 1443-1446, 6 figs. Rolling-mill motors and auxiliary apparatus are cooled by washed air under pressure; efficiency and capacity of electrical equipment depend upon operating temperature.

Vibration Absorbers. Vibration Absorbers for Large Single-Phase Machines, C. R. Soderberg. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 383-387, 8 figs. Discusses elimination of excessive vibrations or of condition of resonance by means of spring-mounted stators, elastic properties of foundations, etc.

Vibrations. See VIBRATIONS, Machinery.

Voltage Regulation. Some Observations on Voltage Regulation (Alcune osservazioni intorno alla regolazione della tensione), F. Neri. Elettrotecnica, vol. 11, no. 28, Oct. 5, 1924, pp. 689-695, 11 figs. Discusses asynchronous and synchronous machines, transformers, and induction regulators in connection with voltage regulation.

ELECTRICAL MEASUREMENTS

Alternating Current at Telephonic Frequencies. A. C. Measurements at Telephonic Frequencies (Les mesures des grandeurs électriques sous courant alternatif de fréquence musicale), L. Cahen and J. Carvallo. Jl. de Physique & le Radium, vol. 5, no. 4, Apr. 1924, 113-125, 15 figs. Useful descriptive summary of apparatus and methods used in making a.c. measurements at telephonic frequencies; apparatus required; describes several a.c. bridges of Wheatstone type, with their particular uses and experimental procedure adopted in each case; uses of inter-bridge transformers and Wagner earth connection; describes a.c. potentiometer.

Capacity. A Method for Measuring Very Small Capacities, L. Hartshorn. Physical Soc. Lond.—Proc., vol. 36, part 5, Aug. 15, 1924, pp. 399-404, 3 figs. Describes a bridge arrangement suitable for measurement of capacities of order of 1 micro-microfarad and less at telephonic frequencies.

On the Measurement of Very Small Changes of Capacity, R. Gunn. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. of Sci., vol. 48, no. 283, July 1924, pp. 224-226, 6 figs. Describes new method sensitive enough to give change of one microampere for capacity change of 10-15 farad.

The Measurement of Capacity by Analogy, Wm. Cramp. World Power, vol. 2, no. 11, Nov. 1924, pp. 267-273, 4 figs. Develops method of measurement by analogy, to show that it is capable of giving very accurate results, that it can be applied to all condensers, and that it calls for no more equipment than a source of direct current, a voltmeter, ammeter, and a standard that is easily made.

Dimmer Bridge. Technical Application of Dimmer Relays [Eine technische Anwendung des Glimmrelais (Glimmbrücke)], H. Geffcken and H. Richter. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 511-514, 6 figs. Discusses use of dimmer generators for measuring purposes and describes dimmer bridge enabling measurement of capacities of 10 to 10^7 cm. and resistances of 10^3 to 10^8 ohms very rapidly to an accuracy of 1 per cent.

Energy in A. C. Circuits. The Measurement of Electrical Energy in A. C. Circuits, G. W. Stubbings. World Power, vol. 1, no. 3, Mar. 1924, pp. 164-170, 5 figs. Reviews method of metering energy in high-power circuits, examining more particularly difficulties introduced by use of instrument transformers; considers methods of metering energy in 3-phase circuits.

High-Frequency. Refined High-Frequency Measuring for Technical Purposes [Verfeinerte Hochfrequenzmessung zu technischen Zwecken (Torkontrolle)], H. Geffcken and H. Richter. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 493-495, 2 figs. Describes a high-frequency method by means of which small pieces of metals carried by persons may be traced acoustically.

Induction and Capacity. Using Alternating Current for the Measurement of Coefficients of Induction and of Capacities (Emploi du courant alternatif pour la mesure des coefficients d'induction et des capacités), O. De Bast. Association des Ingénieurs Electriciens Sortis de l'Institut Electrotechnique Montefiore—Bul., vol. 2, no. 8-9, Aug.-Sept. 1924, pp. 281-292, 8 figs. Discusses Maxwell, De Sauty, Anderson, Foster, Vaschy, and Touanne methods.

Output and Consumption. Measurements of Apparent Output and Consumption (Ueber Blindleistungs- und Blindverbrauchsmessungen), R. Scheld. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 49-58, 4 figs. Investigation by means of measurements and calculations of faults in artificial connections through asymmetry of voltage triangle.

Self-Induction and Resistance. See ELECTRIC CONDUCTORS, Self-Induction and Resistance Measurement.

ELECTRICITY

Applications of. See ELECTRICITY, APPLICATIONS OF.

Atmospheric, Free Balloons and. See BALLOONS, Atmospheric Electricity and.

Atmospheric, Measurement of. Measuring Electric Potential From Airplanes (Die Messung elektrischer Spannungen vom Motorluftfahrzeug aus), A. Wigand and T. Schlomka. Annalen der Physik, vol. 75, no. 19, Sept. 1924, pp. 279-325, 6 figs. Details of suitable method for measurement of atmospheric potential from airplanes or airships. Measurements in airplanes in motion show considerable positive auto-charge of engine, depending on its capacity, and negative charge of exhaust gases.

Contact. Studies on Contact Electricity: Bubbling Effect in Liquid Metals (Studien zur Berührungselektrizität: Ueber den Aprudeleffekt an flüssigen Metallen), A. Coehn and Em. Duhme. Zeit. für Physik, vol. 27, no. 5-6, 1924, pp. 358-383, 18 figs. Shows that gases passing through pure mercury carry away positive charge and leave metal charged negatively; addition of sodium, zinc, and cadmium reverses signs, addition of tin, copper, silver, and gold.

Studies on Contact Electricity: Charging Metals Against Dielectrics (Studien zur Berührungselektrizität: Die Ladung von Metallen gegen Dielektrika), A. Coehn and A. Curs. Zeit. für Physik, vol. 29, no. 3-4, 1924, pp. 186-195, 4 figs. Concludes that charging metals in high vacuum depends on nature of metal, its tendency to give off electrons, nature of dielectric, and its capacity to absorb positive metal ions.

Development. Fifty Years in Retrospect. Elec. Wld., vol. 84, no. 12, Sept. 20, 1924, pp. 570-640, 70 figs. A number of articles by different authors briefly reviewing developments in telephony, electric railways, radio, electric lighting and illumination, frequency selection and standardization, hydroelectric engineering, power transmission, protection against lightning, electric motor control, etc.

Electrometric Measurement. The Significance of Labilization in the Electrometric Measurement of Small Quantities of Electricity (Ueber die Bedeutung der Labilisierung bei der elektrometrischen Messung kleiner Elektrizitätsmengen), G. Hoffmann. Physikalische Zeit., vol. 25, no. 1, Jan. 1, 1924, pp. 6-8, 3 figs. Considers charge and deflection of electrometer in two stages: (a) potential change during charging of stationary instrument; (b) oscillations and equilibrium position; comparison between thread and quadrant electrometers with respect to measurement of small charges; advantage is taken of instability factors (labilization) to improve sensitiveness which constitutes new development in electrometric measurement technique.

Heaviside's Operators. Heaviside's Operators in Engineering and Physics, E. J. Berg. Franklin Inst.—Jl., vol. 198, no. 5, Nov. 1924, pp. 647-702, 34 figs. Mathematical definitions, and solutions of various problems; derivation of expansion theorem; author points out that, if with present accepted definitions of functions, derivatives, etc., it had been possible to reconcile Heaviside's operators to conventional mathematics, a great contribution would have been made, but it can never be done.

Propagation of, Velocity. Velocity of Propagation of Electricity (La vitesse de propagation de l'électricité), C. Gutton. Annales des Postes Télégraphes et Téléphones, vol. 13, no. 9, Sept. 1924, pp. 949-966, 6 figs. Discusses successive experiments and theories leading to a solution of essential points of problem.

Supply. See ELECTRICITY SUPPLY.

ELECTRICITY, APPLICATIONS OF

Agriculture. Application of Electricity to Agricultural Machinery (Les applications de l'électricité aux appareils agricoles), M. Mousset. Société Française des Electriciens—Bul., vol. 4, no. 36, June 1924, pp. 515-531. See also Société des Ingénieurs Civils de France—Memoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 279-297, 12 figs. on supp. plate. Cooperation between state, electricians and farmers; educational rôle of electric centrals; agricultural implements and machinery, their classification, uses and power requirements; electric plants on farms.

Electric Fodder Installations (Elektrofutteranlagen), H. Osten. Elektro-Journal, vol. 4, no. 3, Mar. 1924, pp. 82-85, 1 fig. Report on present status of introduction of electric fodder installations and present opinions on subject. Sterilization of fodder by electricity saves about 25 per cent of feed value. Economic importance of subject is emphasized.

Electric Tillage (Le labourage électrique), M. Guedeney. Société Française des Electriciens—Bul., vol. 4, no. 36, June 1924, pp. 533-545, 4 figs. See also Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 314-323, 4 figs., partly on supp. plate. Discusses results obtained with electric tillage, operation of electric plows and other implements, use of movable transformer stations, etc.

Electricity in Agriculture Abroad, R. A. Lundquist. Agricultural Eng., vol. 5, no. 7, July 1924, pp. 151-154. Discusses progress made in Sweden, bases of charges for service, use of fuel-burning plants in Germany, slow progress in France, high cost of service in England, use of mechanical power on farms of New Zealand; most progress has been made by Sweden and New Zealand.

Electrification of Farms in Sweden, T. Holmgren. Elec. Wld., vol. 83, no. 4, Jan. 26, 1924, pp. 178-182, 5 figs. Most economical system of distribution found to be dependent on density of population. Formation of farmers' organizations and details of equipment best suited to farmers' needs.

French Rural Electrification, H. A. Carney. Elecn., vol. 93, no. 2426, Nov. 14, 1924, pp. 550-551 and 555, 5 figs. Applications of electricity to farming and rural industry shown at Exhibition and Congress at Lyons.

Notes on Progress of Farm Electrification. Nat. Elec. Light Assn.—Bul., vol. 11, no. 1, Jan. 1924, pp. 23-25, 1 fig. Comparison of rural line financing in Ontario and Minnesota; farm electrification survey; criticism of alleged attitude of light and power companies regarding individual plants; present status of electrical machinery for rural purposes.

Progress in Rural Service Study, A. M. Perry. Elec. World, vol. 84, nos. 24 and 25, Dec. 13 and 20, 1924, pp. 1253-1257 and 1297-1301, 11 figs. Twelve states have embarked on economic investigation, and seven more are expected to organize; what Minnesota has already accomplished.

Some Research Features of the Application of Electricity to Agriculture, R. W. Trullinger. Agricultural Eng., vol. 5, nos. 8 and 9, Aug. and Sept. 1924, pp. 180-185 and 203-208. Analyzes in a preliminary manner some of the more important research features involved in a proposed development, having for its ultimate objective exclusive use of electricity in all agricultural processes requiring a tangible source of energy. Bibliography.

The French Electro-Farming Congress and Exhibition, R. Borlase Matthews. Elec. Rev., vol. 95, nos. 2450 and 2451, Nov. 7 and 14, 1924, pp. 686-687 and 724-725, 9 figs. Review of papers and exhibits.

Use of Electricity in Agriculture (L'emploi de l'électricité dans l'agriculture). Electricien, vol. 55, no. 1358, Oct. 15, 1924, pp. 459-464, 12 figs. Discusses motor application, transmission masts, transformers and line equipment, and gives list of agricultural implements and their power consumption.

Canada. Utilization of Power. Eng. Jl., vol. 7, no. 7, July 1924. Group of papers read at World Power Conference. Introductory Statement to Symposium, P. T. Davies, pp. 447-451; Electricity

in the Canadian Home, F. A. Gaby, pp. 451-458, 8 figs.; Electrical Service for Rural Districts, F. A. Gaby, pp. 458-472, 19 figs.; Utilization of Power in the Pulp and Paper Industry, R. W. Leeper, pp. 473-476, 6 figs.; Use of Power in the Mineral Industries of Canada, H. E. M. Kensit, pp. 477-483, 6 figs.; Use of Electric Power in the Cement Industry of Canada, W. G. H. Cam, pp. 484-485, 3 figs.; Use of Power for Port Facilities, M. T. S. Casey, pp. 486-488, 2 figs.; Power Requirements in the Lumbering Industry in British Columbia, A. M. Smith, pp. 488-492, 5 figs.; Application of Compressed Air in Industry, F. A. McLean, pp. 492-498, 5 figs.; Electro-Chemical and Electro-Metallurgical Uses of Power, L. E. Westman, pp. 498-501, 3 figs.; Power in Transport, D. E. Blair, pp. 502-522, 32 figs.; Illumination, W. H. Woods, pp. 522-526, 11 figs.; Recent Developments in Electric Lamps, J. T. Scott, pp. 526-527.

Ceramic Industries. Electricity in the Ceramic Industries, A. B. Searle. World Power, vol. 2, no. 10, Oct. 1924, pp. 226-231, 7 figs. Discusses its use as source of power, light and heat, as means for purifying ceramic materials, and for operating instruments for controlling temperature or processes of manufacture.

Development. A Hundred Years of Electrical Engineering, G. W. O. Howe. Engineer, vol. 138, no. 3580, Aug. 8, 1924, pp. 166-168. Traces development during last hundred years of some of the principal applications of electricity to service of mankind.

Farm Machinery. See FARM MACHINERY, Electricity Applications.

Lumber Mills. Electric Power Application in Pacific Northwest Fir Mills, J. L. Wright. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1117-1123, 9 figs. Application to logging, sawmilling, and planing mill or finishing plant; type of electrical equipment; head saws; power-factor correction. (Abridgment.)

Medical and Surgical. Medical and Surgical Applications of Electricity (Applicazioni dell' electtricita alla medicina e chirurgia), G. Panbianco. Elettrotecnica, vol. 10, no. 32, Nov. 15, 1923, pp. 766-770, 9 figs. Description of the various electrical applications for medical and surgical purposes; discusses especially radiology; comparison between Röntgen and Coolidge tubes, and discussion of progress made by latter.

Power. Fields for Power Sales Development, E. W. Lloyd. Elec. Wld., vol. 84, no. 11, Sept. 13, 1924, pp. 518-520, 4 figs. Describes importance of improving load factor and gives outline of methods of power sales department with which author is connected. Promotion of use of electricity for heat treating and industrial baking processes strongly recommended. Opportunities in electric vehicle load.

Switzerland. Applications of Electric Energy (Ueber Verwertung der elektrischen Energie im Inland), E. Boder. Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 9, Sept. 1924, pp. 461-470, 9 figs. Reviews the various uses of electric energy in Switzerland as heat for domestic and industrial purposes, including new forms of application; coöperation of producers and consumers; etc.

Textile Industry. Electricity in the Textile Industry, W. Muhlens. Electrician, vol. 93, no. 2416, Sept. 5, 1924, p. 261. Gives notes on conditions in Germany. Abstract from article translated from Elektrotechnische Zeit.

ELECTRICITY SUPPLY

Analysis. Electricity Supply Analysed, C. H. Merz. Electrician, vol. 93, no. 2416, Sept. 5, 1924, pp. 254-255. Discusses transmission and distribution of electrical energy. Abstract of paper read before First World Power Conference.

British Empire Exhibition. Electricity Supply at Wembley. Electrician, vol. 92, no. 2393, Mar. 28, 1924, pp. 386-388, 5 figs. Electricity for lighting, power, and amusement demands of British Empire Exhibition.

Carolinas. The Power Supply of Southern Industry, R. G. Macy. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 663-668, 7 figs. The Piedmont section of the Carolinas; demand for power; steam-power plants; portable substations.

Central Station vs. Private-Plant. See CENTRAL STATIONS, Private Plant vs.

Christiania. Electricity Supply in Christiania. Electrician, vol. 93, no. 2414, Aug. 22, 1924, pp. 200-202, 4 figs. Describes changing from bulk supply; forming electricity district.

Consumption Limitation. Development of Electricity Application by Forfeiture Rates (Le développement des applications de l'électricité favorisé par la tarification à forfait), M. Jorgensen. Revue Générale de l'Electricité, vol. 16, no. 22, Nov. 29, 1924, pp. 875-878, 2 figs. Discusses system of forfeiture rates based solely on maximum power consumer can use, and describes Jacobsen apparatus for current limiting, i.e., shutting off of current supply when consumer uses more than he is entitled to.

Costs, Britain. Fuel Consumption and Power Supply Economics, H. Quigley. World Power, vol. 2, no. 10, Oct. 1924, pp. 210--217, 4 figs. Shows present status of power costs in Britain with special reference to municipal undertakings.

Farming Communities. Electricity Supply of Farming Communities From Small Generating Stations, U. V. Skobalzyn. Electritchestvo, no. 4, Apr. 1924, pp. 209-220, 6 figs. An article based to some extent on German practice and also on some Russian practice. Includes Russian statistics. (In Russian.)

Government Ownership of Plants. See ELECTRIC POWER, Government Ownership of Plants.

Great Britain. British Electric Power Supply, H. D. Butler. Elec. World, vol. 84, no. 16, Oct. 18, 1924, pp. 841-842. Progress made in reorganization of electricity undertakings in United Kingdom; coördinating present systems.

Interconnection and Farm Service. Interconnection and Service to the Farm, Gifford Pinchot. Elec. World, vol. 83, no. 21, May 24, 1924, pp. 1095-1096. Points out that hope of rural electric service lies in regulated private industry with pooling of power for large-area use; state lines should interpose no obstacle to extension of interconnection for good of all.

Leningrad, Russia. Electricity Supply of Leningrad, I. A. Skanavi. Electritchestvo, no. 4, Apr. 1924, pp. 176-190, 8 figs. Critical description of system, together with extensive statistical data, including production per workman and rates. (In Russian.)

London. Electricity in the Region of London, D. Heineman. World Power, vol. 2, no. 9, Sept. 1924, pp. 138-145. Notes on production of electric current; invested capital; utilization of plant; citing notable examples in Europe and America; transport.

New England. New England's Power Needs. Elec. World, vol. 83, no. 18, May 3, 1924, pp. 877-881, 8 figs. See also Power, vol. 59, no. 19, May 6, 1924, pp. 725-728, 3 figs. Claims that growth of public-utility energy supply through expansion and interconnection of steam and hydroelectric systems will meet major requirements of Northeast for many years; Canadian power expected to find profitable future market.

Rates. Fundamentals of Public Utility Power Rates, E. Douglas. Nat. Engr., vol. 28, no. 4, Apr. 1924, pp. 151-154, 1 fig. Simple explanation of the different charges in public utility power

rates; how to figure current charges to determine amount paid per kilowatt-hour; load factors and their effect on central-station rates.

The Theory of Rate-Making for Electrical Supply, K. Baba. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 433, Aug. 1924, pp. 725-760, 6 figs. Author gives general and fundamental theory which should be applied in order to fix reasonable rate for electric services; criticism of cost-of-service and value-of-service theories as rate bases; general method of rate making based on cost of service; methods of simplifying rate system. (In Japanese with abstract in English.)

South Australia. Electricity Supply at Adelaide, F. W. H. Wheadon. Elec. Rev., vol. 95, nos. 2441 and 2442, Sept. 5 and 12, 1924, pp. 361-365 and 397-401, 31 figs. Design, construction and equipment of Osborne generating station; transmission and distribution systems.

ELECTRIFICATION

Coal Mines. See COAL MINES, Electrification.

Railways. See RAILWAY ELECTRIFICATION.

ELECTROCHEMICAL INDUSTRY

Developments. Development of Electrochemical Industry Between 1913 and 1923 (Die Entwicklung der elektrochemischen Industrie in den Jahren 1913-1923), N. L. Müller. Elektrotechnik u. Maschinenbau, vol. 42, nos. 28 and 29, July 13 and 20, 1924, pp. 437-442 and 458-463. Deals with electrolysis of aqueous solutions, production of copper, etc.; electro-osmosis, production of aluminum and magnesium; electrothermic processes, including calcium carbide, iron and steels, graphite, nitrogen fixation, dust precipitation, etc.

Economic Importance of Electrochemistry (Die weltwirtschaftliche Bedeutung der Elektrochemie), W. Kundt. Technik u. Wirtschaft, vol. 17, no. 7, July 1924, pp. 155-159, 1 fig. Survey of distribution of chemical industry over world shows that electrochemical processes were adopted in countries which lacked necessary conditions for thermic and mechanic processes. Electrolytic process enables mineral exploitation impossible under older methods.

ELECTROCHEMISTRY

Developments. See ELECTROMETALLURGY, Developments.

ELECTRODEPOSITION

Antimony. Electrodeposition of Antimony, J. C. Ghosh and A. N. Kappana. Jl. Physical Chem., vol. 28, no. 2, Feb. 1924, pp. 149-160, 4 figs. Describes experiments and results obtained.

Base-Metal Structure, Influence of. Some Relations Between the Microstructure of Metal Surfaces and Electrodeposition Made Thereon, A. K. Graham. Brass World, vol. 20, no. 1, Jan. 1924, pp. 3-7, 7 figs. Further evidence of influence of structure of base metal on electrodeposits.

Deposits, Structure of. Structure of Electrochemical Deposits (La structure des dépôts électro-chimiques), R. Audibert. Revue de Métallurgie, vol. 21, no. 10, Oct. 1924, pp. 567-584, 22 figs. Discusses crystallization and electrodeposition, classification of crystals, adherence of deposit, and effect of different factors on structure of deposits, including nature of electrolyte, colloids, addition of extraneous substances, current density, temperature, base metal, etc.

Dry. See METALS, Electrodeposition.

Fescol Process. Cheating the Scrap Heap. Motor Transport (Lond.), vol. 39, no. 1030, Nov. 24, 1924, pp. 620-621, 7 figs. Describes electrochemical metal-depositing process developed by Fescol, Ltd., Lond., Eng., for reconditioning worn machinery parts and for prevention of corrosion. Applications of process.

Iron. The Introduction of Carbonaceous Matter in Electrodeposited Iron and Nickel, P. K. Frölich. Am. Electrochem. Soc.—Advance paper no. 12, for meeting Oct. 2-4, 1924, pp. 171-187, 6 figs. on supp. plates. Details of investigation carried out to study significance of colloidal reactions in processes leading to contamination of iron and nickel, when organic materials were dissolved in electrolyte from which deposition occurred.

See also IRON, Electrodeposition.

Metal Parts, Building Up. The Fescol Electrodeposition Process. Chem. Age. (Lond.), vol. 10, no. 262, June 21, 1924, pp. 647-648, 3 figs. Process for building up worn metal parts. Describes results obtained and method used to achieve them.

Metals. See METALS, Electrodeposition.

Nickel. Throwing Power, Cathode Potentials and Efficiencies in Nickel Deposition, H. E. Haring. Am. Electrochem. Soc.—Advance Paper no. 15, for meeting Oct. 2-4, 1924, pp. 209-231, 5 figs. Results of study made to determine throwing power of nickel and to measure cathode potentials and efficiencies during nickel deposition. Results show that chief factor in throwing power in nickel deposition is cathode efficiency. Pub. by permission U. S. Bur. Standards.

Patents. Electrolysis (Including Electrodeposition and Electroplating. Abridgments of Specifications, Class 41, Period 1916-1920, 1924, 83 pp. Patents for inventions in connection with apparatus, cells, diaphragms, electrodes, processes, etc.

Polarization and Structure. The Relation Between Polarization and Structure in the Electrodeposition of Metals, V. Kohlschutter. Am. Electrotechem. Soc.—Advance Paper, No. 5, for meeting, Apr. 24-26, 1924, pp. 63-74. Close relationship is shown to exist between abnormal cathode potential in nickel deposition and certain physical properties of deposit; summary of those parts of author's investigations which bear upon polarization and structure.

Use in Patternmaking. See PATTERNMAKING, Electrodeposition in.

Zinc, Corrosion Resistance of. Corrosion Resistance of Electroplated Coatings of Zinc and Zinc-Mercury Alloys, C. J. Wernlund. Am. Electrochem. Soc.—Paper no. 31, presented at meeting Apr. 24-26, 1924, pp. 403-409. Study of relative rates of corrosion of different kinds of zinc electrodeposits on mild steel. Deposits containing 2 per cent of mercury were more resistant than deposits of pure zinc obtained from either sulphate or standard cyanide baths.

ELECTRODES

Carbon. Burning of Carbon Electrodes (Das Brennen von Kohlen-Elektroden), G. Schuchardt. Chemiker-Zeitung, vol. 48, no. 89, July 24, 1924, pp. 517-518, 3 figs. Discusses care used in preparation of electrodes, Meiser Annual furnace, Söderberg process, coking process, etc.

Contact Potential. On the Contact Potential, S. Takegami. Kyoto Imperial Univ., College of Sci.—Memoirs, vol. 7, no. 2, Feb. 1924, pp. 45-67, 6 figs. Details of experiments.

Electric-Furnace. See ELECTRIC FURNACES, Electrodes.

Electromotive Force. Electromotive Force Produced by the Action of Light on Metals Immersed in Solutions of Their Salts (Forces électromotrices produites par la lumière sur des métaux plongés dans des solutions de leurs sels), G. Athanasiu. Académie des Sciences—Comptes

Rendus, vol. 178, no. 4, Jan. 21, 1924, pp. 386-388. Author has extended his work on mercury electrodes to electrodes of silver, copper, nickel, cadmium, and zinc; e.m.f. produced depends on time of standing and is due to formation of deposit on surface of electrode by chemical reaction.

Platinum, Influence of Light on. Influence of Light and Röntgen Rays on Anodic Polarized Platinum Electrodes (Ueber den Einfluss von Licht- und Röntgenstrahlen auf anodisch polarisierte Platinelektroden), G. Grube and L. Baumeister. Zeit. für Elektrochemie, vol. 30, no. 13-14, July 1924, pp. 322-332, 4 figs. Influence of Röntgen rays on potential of oxidized platinum electrodes is similar to that of ordinary light, and potential of oxygen electrode is affected by alternating current in same way as by light; results are discussed in their relation to Baur's theory of photolysis.

Spherical. Initial Voltage and Rupturing Field Intensity of Spherical Electrodes with D. C. Voltage (Anfangsspannung und Durchbruchfeldstärke von Kugelelektroden bei Gleichspannung), A. Klemm. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 553-592, 32 figs. Purpose of work was to establish experimental fundamentals for rupturing field intensity in air with high-tension direct current: (1) between two equal spheres and (2) between sphere and plane. See also article by W. O. Schumann, entitled The Minimum Rupturing Field Intensity in Spherical Electrodes (Ueber das Minimum der Durchbruchfeldstärke bei Kugelelektroden), pp. 593-608, 4 figs.

ELECTROLYSIS

Brines, Anode Material for. Insoluble Anodes for Electrolysis of Brine. The Lead-Silver Series, C. G. Fink and L. C. Pan. Am. Electrochem. Soc.—Advance Paper no. 8, for meeting Oct. 2-4, 1924, pp. 129-135, 2 figs. Presents anodic corrosion tests for alloys of system silver-lead, and shows that corrosion loss in brine drops very abruptly upon addition of small percentages of silver to lead, or vice versa. Voltage curve is similar to corrosion loss curve.

Currents in Soil, Measurement of. Measuring Electrolytic Currents in Soil, B. A. Williamson. Elec. Ry. Jl., vol. 63, no. 13, Mar. 22, 1924, pp. 503-505, 4 figs. Two new methods of measurement proposed, one based on substitution of known resistance and other on balancing current to give zero galvanometer reading; latter method eliminates calculation of earth resistance; useful in quantitative electrolysis tests.

Electrolytic Cells. Modern Electrolytic Cells, A. J. Hale. Chem. & Industry, vol. 43, nos. 50, 51, and 52, Dec. 12, 19, and 26, 1924, pp. 1224-1233, 1250-1255, and 1291-1294, 37 figs. Deals with cells for winning and refining of metals, production of industrial gases, and for production of various inorganic and organic compounds; types of cells.

Fused Salts. Electrolysis of Fused Salts (Ueber Schmelzelektrolyte), R. Lorenz. Zeit. für Elektrochemie, vol. 30, no. 8, Aug. 1924, pp. 371-375. General notes on subject with special regard to equilibrium between metal and salt in melts; formula developed by author, based on Duhem-Margules vapor-tension isothermal is found to be applicable only to fused lead and cadmium and their chlorides; problem can be solved, however, with aid of van Laar's thermodynamic potentials.

Hypochlorite Solution. The Electrolysis of Hypochlorite Solution, F. Foerster. Am. Elektrochem. Soc.—Advance Paper no. 7, for meeting Oct. 2-4, 1924, pp. 101-128. Careful survey of subject. Shows that it is simply potential at which anions of hypohalogenites are acted upon by current, as compared with discharge potentials or corresponding halogen ions, which determines course of electrolysis of alkali halogenides; and that all details and apparent peculiarities in phenomena attending these electrolytic processes may be investigated and satisfactorily explained with aid of these potentials.

Mercury Cathode. Electrolysis with Cathode of Drops of Mercury (Sur l'électrolyse avec la cathode à gouttes de mercure), J. Heyrovsky. Académie des Sciences—Comptes Rendus, vol. 179, no. 20, Nov. 17, 1924, pp. 1044-1046, 2 figs. Studies commencement of electrolysis with anode of mercury layer and cathode of mercury drops issuing from a capillary, amalgam on drops forming with N potassium salt at -1.883 volts, with 1/10 N at 1.937 volts, with 1/100 N at 2000 volts.

ELECTROLYTES

Dielectric Constants of Solutions. Present Knowledge of Dielectric Constants of Electrolytic Solutions (Der heutige Stand unserer Kenntnisse von den Dielektrizitätskonstanten der wässerigen und nichtwässerigen Elektrolytlösungen), P. Walden and H. Ulich. Zeit. für physikalische Chemie, vol. 110, 1924, pp. 43-56. In estimating most probable result of work on aqueous solutions, authors would give special weight to values obtained by Drude, using method of measurement of wave length, and assume that dielectric constants of dilute aqueous solutions of strong electrolytes are somewhat lower than that of solvent; authors consider it certain that dielectric constants of solutions of salts in poorly dissociating media is higher than that of pure solvent.

Fused, Conductivity of. Fused Electrolytes (Ueber einige Schmelzelektrolyte), W. Biltz and W. Klemm. Zeit. für Physikalische Chemie, vol. 110, 1924, pp. 318-342, 3 figs. Conditions are investigated for obtaining accurate measurements of conductivity of fused metal chlorides; influence is determined on conductivity values of fused salts of varying capacity of cell and form of electrodes, whether of disk, cylindrical, or spherical shape; values for specific conductivities are classified according to periodic system of elements; results are plotted for change of specific conductivity with temperature.

Solubility of Salts, Effect on. Theory of the Effect of Strong Electrolytes on the Solubility of Salts (Theorie der Löslichkeitsbeeinflussung bei starken Elektrolyten), O. Schärer. Physikalische Zeit., vol. 25, no. 7, Apr. 1, 1924, pp. 145-159, 16 figs. It is concluded that classical theory of dissociation of strong electrolytes does not give satisfactory explanation of known facts, as result of critical survey of experimental data; author assumes that solubility effect depends upon electrical forces between ions, electrolytes being completely dissociated; discusses nature and extent of deviations of experimental results from requirements of theories at stronger concentrations.

Theory. Laws of Dilution and Distribution of Strong Electrolytes According to the Theory of Debye (Ueber Verdünnungsgesetze und Verteilung starker Elektrolyte nach der Theorie von Debye), P. Gross and O. Halpern. Physikalische Zeit., vol. 25, no. 16, Aug. 15, 1924, pp. 393-397. Experiments to examine distribution of electrolytes between two immiscible solvents.

ELECTROLYTIC CELLS

Electric Field. Theoretical and Experimental Study of the Electric Field in an Electrolytic Cell, A. A. Ahmed. Instn. Elec. Engrs.—Jl., vol. 62, no. 328, Apr. 1924, pp. 301-317, 19 figs. Investigation of electric field produced when current flows in electrolytic cell having plane parallel electrodes; method of measuring current density

at any point in interior of electrolytic medium; calculation of geometric conductance of electrolytic cell having plane parallel electrodes.

Types. Electrolytic Caustic Soda, C. Elliott. Serial article in Chem. Trade Jl., vol. 75, beginning July 11 and ending Dec. 5, 1924, 19 figs. A comparative study of cell design and efficiency. July 11: General and theoretical consideration. July 18, 25, Aug. 1 and 8: Cells of diaphragm, mercury, and fused-salt types. Aug. 22 and 29: Main features in choice of a cell. Sept. 19, Oct. 3 and 31: Design of a diaphragm-cell plant. Dec. 5: Evaporation of cell effluent.

ELECTROMAGNETIC FIELDS

Constants. Ferromagnetic Constants for Low A. C. Fields (Die ferromagnetischen Konstanten für schwache Wechselfelder), H. Jordan. Elektrische Nachrichten-Technik, vol. 1, no. 1, July 1924, pp. 7-29, 10 figs. Discusses ferromagnet after-effect and hysteresis in weak fields; determination of ferromagnetic constants for weak fields by means of a.c. measurements, etc.

Produced at Great Distance. Calculation of Field Produced at Great Distance by a High-Frequency Current in Any Straight Conductor (Calcul du champ produit à grande distance par un courant à haute frequence circulant dans un conducteur rectiligne de longueur quelconque), J. Bethenod. Revue Générale de l'Electricité, vol. 16, no. 12, Sept. 20, 1924, pp. 451-452, 1 fig. Shows an easy way of finding field from length of oscillator becoming comparable to length of wave used.

ELECTROMAGNETIC WAVES

Plane. Transformation of Electric and Magnetic Forces in a Plane Wave, in a Plane Normal to the Direction of Relative Motion of Two Observers, V. Karapetoff. Jl. Optical Soc. Am. & Rev. of Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 239-244, 2 figs. Two observers are assumed to move along X axis and to measure components of electric intensity E (E_1, E_2, E_3) and magnetic intensity H (H_1, H_2, H_3) of a plane electromagnetic wave propagated at an arbitrary angle to X axis.

Propagation. Distortion of an Electromagnetic Disturbance Passing Along an Insulated Conductor Line (Sur la distorsion d'une perturbation électromagnétique se propageant le long d'une ligne conductrice isolée), A. Dufour. Académie des Sciences—Comptes Rendus, vol. 179, no. 22, Dec. 1, 1924, pp. 1255-1257. Discusses skin effect, i. e., damping of wave due to non-uniform distribution of current in cross section of conductor, and method for directly recording it.

Experimental Research on the Propagation of Electromagnetic Waves Along Wires (Recherches expérimentales sur la propagation des ondes électromagnétiques le long des fils), G. Laville. Annales de Physique, vol. 2, series 10, Sept.-Oct. 1924, pp. 328-404, 14 figs. Discusses propagation of sinusoidal periodic oscillations along two parallel metal wires and compares results with theory of Heavyside, Vaschy, Poincaré and Mie. using copper, bronze, aluminum, iron, and nickel wire.

New Research on Propagation of Electromagnetic Waves (Neue Untersuchungen über die Ausbreitung der elektromagnetischen Wellen), M. Bäumler. Elektrische Nachrichten-Technik, vol. 1, no. 2, Aug. 1924, pp. 50-64, 18 figs. Details of extensive quantitative measurements of American radio stations WQK and WSO for examining wave propagation; weakening of waves at separating planes of atmospheric layers of unequal density; agreement of L. W. Fuller absorption factor with measuring results. Bibliography.

Propagation of Electric Waves Along Perfectly Insulated Iron Lines, Taking Into Consideration the Skin Effect (De la propagation des ondes électriques le long des lignes en fer parfaitement isolées, en tenant compte de l'effect pelliculaire), A. Leaute. Académie des Sciences—Comptes Rendus, vol. 179, no. 13, Sept. 29, 1924, pp. 597-600. Discusses effect of skin on damping of harmonics which becomes more marked as harmonics become higher in pitch.

Propagation of Electric Waves Over the Earth (Die Ausbreitung der elektrischen Wellen über die Erde), A. Meissner. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 485-488, 5 figs. Concludes that there is no Heaviside layer; recommends radiation antennas for long-distance operation at night with short waves.

Theory. The Electromagnetic Wave in Technics (Die elektromagnetische Welle in der Technik), K. W. Wagner. Elektrische Nachrichten-Technik, vol. 1, no. 1, July 1924, pp. 1-7, 3 figs. Discusses work of Hertz, Faraday, Maxwell, Marconi, etc., resulting in present radio development.

ELECTROMAGNETISM

Laws. Examination of Carl Hering's Ideas on the Necessity of a Revision of the Laws of Electromagnetism (Examen des idées de M. Carl Hering sur la nécessité d'une revision des lois de l'électromagnétisme), A. Lienard. Revue Générale de l'Electricité, vol. 16, nos. 21 and 22, Nov. 22 and 29, 1924, pp. 811-819 and 851-859, 18 figs. Concludes that classic laws on induction and electrodynamics explain all his points, that Hering does not propose any suitable substitute laws, but shows necessity for more precision in instructing students.

Formulation of Electromagnetic Laws, P. Florensky. Russian Elec. Jl. (Elektrichestvo), no. 11, Nov. 1923, pp. 537-544, 9 figs. Author criticises common expressions of laws of electric and magnetic phenomena and emphasizes fact that separate magnetic masses are unknown, as well as magnetic conductivity; takes up law of mutual action of two currents and claims that it is not currents that attract or repel each other, but conductors with currents, which means that this attraction or repulsion is either result of stresses in ether or of action between matter and matter and not between electrons composing currents.

ELECTROMAGNETS

Telegraph and Telephone. See TELEGRAPHY, Electromagnets.

Telegraphic. Construction and Operation of Electromagnets Employed in Telegraphy (Étude sur la construction et le fonctionnement des électro-aimants employés en télégraphie), J. H. Gosselin. Annales des Postes Télégraphes et Téléphones, vol. 13, no. 6, June 1924, pp. 612-627, 10 figs. Develops theory as to most suitable cross-section of pole pieces and gives results of experimental verification.

Telephone Relays. Design Characteristics of Eletromagnets for Telephone Relays, D. D. Miller. Bell System Technical Jl., vol. 3, no. 2, Apr. 1924, pp. 206-231, 18 figs. Electromagnets described are confined to relays, but principles involved apply as well to selector magnets, clutch magnets, and electromagnets in general. Treatment from viewpoint of telephone engineer of important considerations which determine design of magnetic parts of relays and economics of winding dimensions.

ELECTROMETALLURGY

Applications. Electro-Metallurgical Applications, J. L. McK. Yardley. Blast Furnace & Steel Plant, vol. 12, no. 12, Dec. 1924, pp. 532-535, 1 fig., and vol. 13, no. 1, 1925, pp. 20-25 and 30, 11 figs. Discussion of electric-power utilization developments which are based on fundamental principles of physical chemistry and electrochem-

istry; deals only with metals which are ordinarily employed in construction or manufacture and in production of which large quantities of electric power are employed; compares smelting and electrolytic methods; data and illustrations on plants and equipment for production of iron, zinc, copper, nickel, aluminum, etc.

Developments. Recent Developments in Electrochemistry and Electrometallurgy (L'électrochimie et l'électrométallurgique d'apres les brevets récents), L. Jumau. Revue Générale de l'Electricité, vol. 15, nos. 16 and 17, Apr. 19 and 26, 1924, pp. 695-708 and 749-766, 35 figs. Study of recent improvements in electrolysis and electric furnaces. Apr. 19: Deals with electrolytes, electrodes, diaphragms, electrolysis of water and alkaline chlorides, preparation of chemical, mineral and organic products, etc. Apr. 26: Arc, resistance, and induction furnaces and their fittings; melting and reheating of metals; melting of glass; manufacture of lime, cement, and brick; manufacture of aluminum and carbide of calcium; treatment of minerals; manufacture of iron and its derivatives; fixation of nitrogen, etc.

Review of Electrochemistry and Electrometallurgy Between 1914 and 1923 (Aperçu sur l'Electrochimie et l'Electrométallurgie de 1914 à 1923), G. Flusin. Houille Blanche, vol. 23, no. 89-90, May-June 1924, pp. 71-75. Discusses electric furnaces and electrodes, electrolytic electrochemistry and electrometallurgy, electrothermic electrochemistry and electrometallurgy and advancement in their activities.

ELECTROMETERS

High-Frequency Measurement. The Use of Electrometers for the Measurement of High Frequency (Emploi de l'électromètre dans les mesures à haute frequence), M. V. Ylostalo. Annales des Postes Télégraphes & Téléphones, vol. 13, no. 1, Jan. 1924, pp. 37-47, 3 figs. Application to measurement of resistances and of coefficients of self-induction.

Idostatic. See LIQUIDS, Dielectric Constants, Measurement of.

Improved Form. A New Form of Electrometer, F. A. and A. F. Lindemann and T. C. Keeley. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 279, May 1924, pp. 577-583. New electrometer is capable of sensitivity as great as that of any existing electrometer, although its period is less than 1 sec. and its capacity less than 2 cm.; useful for many laboratory purposes even where independence of zero and sensitivity to tilt is not essential.

Quadrant. A New Type of Electrometer (Sur un nouveau type d'électromètre), M. B. Szilard. Académie des Sciences—Comptes Rendus des Séances, vol. 178, no. 23, June 2, 1924, pp. 1887-1890, 1 fig. See also Génie Civil, vol. 84, no. 25, June 21, 1924, p. 604. Describes transportable apparatus which is stronger than usual galvanometers and electrometers and permits electrometer measurements without use of constant-voltage battery.

ELECTROMETRY

Lamps with Several Electrodes. Lamps with Several Electrodes in Electrometry (Sur l'emploi des lampes à plusieurs electrodes en electrométrie), P. Lejay. Académie des Sciences—Comptes Rendus, vol. 178, no. 26, June 23, 1924, pp. 2171-2173. Development of method previously described; aim has been to ascertain whether it was possible to make radium capsules, ordinarily used as collectors, to act directly upon electrodes of lamp without modifying potential of these capsules; it was found possible with considerable accuracy.

ELECTRON METAL. See MAGNESIUM ALLOYS, Electron.

ELECTRON TUBES

Amplifiers. Electron Tube Amplifiers in Alternating Current Circuit (Der Elektronenröhrenverstärker im Wechselstromkreise), F. Ollendorff. Archiv für Elektrotechnik, vol. 13, no. 4, July 31, 1924, pp. 274-291, 14 figs. Discusses deduction of general equations for quantitative relation between total currents and tensions in amplifier; behavior of amplifiers in low and in high frequency, etc.

Calculation. Electron Tubes for Radiotelegraphy (Progetto di tubi elettronici per radiotelegrafia), C. Matteini. Elettrotecnica, vol. 11, no. 26, Sept. 15, 1924, pp. 621-629, 13 figs. Methods adopted for determining dimensions of principal parts at Italian Marine Laboratory. Characteristics and calculation of filaments; temperature distribution along filament; calculation of dimensions of receiving triodes and transmitting triodes, and of two-electrode tubes.

Capacities. Capacities of Electron Tubes (Ueber Kapazitäten in Elektronenröhren), E. Schrader. Jahrbuch der drahtlosen Telegraphie u. Telephone, vol. 24, no. 2, 1924, pp. 27-38, 29 figs. Discusses calculation of apparent tube capacities from Möller's tube data, measurement, deviations and their explanation; comparison of formulas with experimental results; practical application; measuring high-frequency amplifiers; etc.

Curve-Drawing Apparatus. Curve Drawing Apparatus for Electron Tubes (Ein selbsttätiger Kennlinienschreiber für Elektronenröhren), H. Stahl. Elektrotechnische Zeit., vol. 45, no. 48, Nov. 27, 1924, pp. 1313-1315, 7 figs. Principles and description of a semi-automatic apparatus devised by author with aid of which characteristic curves (curves of the various electrical data of a particular tube) can be plotted mechanically by unskilled operators in a routine way.

D. C. Motor Speed Regulation. Speed Regulation of D. C. Motors with Electron Tubes (Regelung der Drehzahl von Gleichstrommotoren mittels Glühkathodenröhren), W. Taeger. Elektrotechnische Zeit., vol. 45, no. 6, Feb. 7, 1924, pp. 96-98, 3 figs. To maintain constant speed of d.c. motor, or to secure constant potential on generators, author describes successful use of electron tubes; machine to be regulated carries auxiliary field winding, which acts in opposition to main field; through auxiliary winding current from small tachometer dynamo, connected rigidly to main machine, is passed over two or more electron tubes in parallel; not every kind of tube is suitable for this purpose; mathematical means of determining resistance of auxiliary winding and number of tubes required, are given in general terms, with practical example.

High-Tension Relays. Electron Tubes as High Tension Relays (Die Elektronenröhre als Hochspannungsrelais), A. Imhof. Schweiz. Elektrotechnische Verein Bul., vol. 15, no. 7, July 1924, pp. 361-363, 3 figs. Discusses application as relays for signaling in high-tension lines, especially for distance indication of voltage conditions.

High-Vacuum. Technics of High Vacua for Electron Tubes (Sulla tecnica degli alti vuoti per tubi elettronici), G. Montefinale. Elettrotecnica, vol. 11, no. 26, Sept. 15, 1924, pp. 618-621. Discusses effects of internal ionization, occlusions, quality of glass, heat treatment of electrodes and glass, vacuum pumps, liquid vacuum pumps, liquid air for vacuum production, etc.

Oscillations. A Singular Case of Electron Tube Oscillations, G. Breit. Franklin Inst.—Jl., vol. 197, no. 3, Mar. 1924, pp. 355-358. Describes singular oscillation of apparently new type

observed while trying to reproduce oscillations described by Barkhausen and Kurz.

Secondary Radiation. Rôle of Secondary Radiation in Electron Tubes (Ueber die Rolle der Sekundärstrahlung in Elektronenröhren), H. Salinger. Zeit. für Technische Physik, vol. 5, no. 3, 1924, pp. 96-99, 4 figs. Details of measurements on double grid tubes and conclusions to be drawn from them for electron tube phenomena generally.

ELECTRONS

Capture by Alpha Particles. The Capture and Loss of Electrons by α Particles, E. Rutherford. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 277-303, 4 figs. Author seeks to verify conclusion of Henderson by scintillation method where energy of particles can be estimated by brightness of scintillations and their number determined by direct counting; and tests whether methods could be devised for determining frequency of capture and loss of electrons by α particles and its variation with velocity of α particles.

Emission from Hot Bodies. On the Law and Mechanism of the Emission of Electrons from Hot Bodies, S. Chandra Roy. Lond., Edinburg & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 279, May 1924, pp. 561-569. In author's opinion, it seems that photoelectrons and electrons emitted by heat must be identical in nature in whatever way they may exist in metals relative to atomic nuclei.

Emission, Thermodynamics of. Thermodynamics of Electron Emission, O. W. Richardson. Roy. Soc.—Proc., vol. 105, no. A732, Apr. 1, 1924, pp. 387-405. Deals with applications of thermodynamics to electron atmospheres in equilibrium with matter.

Kinetic Energy. The Kinetic Energy of Electrons Emitted from a Hot Tungsten Filament in an Atmosphere of Argon and of Hydrogen, J. F. Congdon. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 458-465, 3 figs. Average energy of electrons emitted from hot tungsten filament in vacuo is shown to be in close agreement with requirements of Maxwell's distribution law; presence of argon over wide range of pressures has no effect on measured average energy; presence of hydrogen, even at low pressures, appears to increase measured average energy considerably.

Mobilities, Variable. The Effect of Variable Electron Mobilities on the Formation of Negative Ions in Air, L. B. Loeb. Franklin Inst.—Jl., vol. 197, no. 1, Jan. 1924, pp. 45-46, 6 figs. Equation is deduced which is given in form originally worked out by Dr. M. Mooney, but later modified by writer to fit experiments.

Motion in Neon. The Motion of Electrons in Neon, V. A. Bailey. Lon., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 379-384, 3 figs. Investigation of behavior of electrons in neon; experimental results are given in tabular form.

ELECTROPLATING

[See also ELECTRODEPOSITION.]

Addition Agents. Studies on Electro-Plating, W. E. Hughes. Metal Industry (Lond.), vol. 24, nos. 15, 16, 17, and 18, and vol. 25, nos. 2, 3, 4, 5, and 12, Apr. 11, 18, 25, May 2, July 11, 18, 25, Aug. 1, and Sept. 19, 1924, pp. 345-347, 369-372, 393-395, 417-419, 25-27, 49-53, 73-75, 103-104, and 269-273, 6 figs. Addition agents, their use in practice and theoretical principles and explanations concerning function and action of such agents; effects of acid and gelatin on structure of electrodeposited zinc.

Anodes, Functions and Dissolution. Studies on Electro-Plating, W. E. Hughes. Metal Industry (Lond.), vol. 25, nos. 21, 22, 23, and 24, Nov. 21, 28, Dec. 5 and 12, 1924, pp. 491-493 and 496, 519-521, 543-546, and 567-568, 1 fig. Functions and dissolution of anodes.

Chromium Plating of Steel. Chromium Plating Steel Using Chromium Anodes, K. W. Schwartz. Brass Wld., vol. 20, no. 3, Mar. 1924, pp. 85-88. Results of experiments on effect of chromium sulphate on concentration at various current densities, effect of hydrogen ion concentration, effect on deposit of substituting chromium anodes in place of lead and of platinum anodes, and extent of passivity of chromium anodes after prolonged electrolysis.

Cleaning Solutions. The Value of Trisodium Phosphate as an Alkali Cleaner, R. P. Fulkerson. Brass Wld., vol. 20, no. 7, July 1924, pp. 237-239. Notes on emulsification method, which involves use of an alkali solution, for removal of oils from surfaces, in industrial processes such as electroplating, painting, and japanning. Details of tests made to determine cleaning power of solutions.

Developments. Recent Progress in Electroplating and Electroforming, W. Blum. Am. Electrochem. Soc.—Advance Paper No. 9, for meeting Apr. 24-26, 1924, pp. 129-134. Brief review of developments during post-war period, pointing out relations and possible significance of work completed or in progress.

Electron Theory and. Studies on Electro-Plating, W. E. Hughes. Metal Industry (Lond.), vol. 24, nos. 3 and 4, Jan. 18 and 25, 1924, pp. 49-52 and 73-76. The electron theory and electroplating. Jan. 18: Electron and electrolytic ion; electron theory applied to plating bath. Jan. 25: Phenomena of discharge at anode and cathode.

Machine-Gun Barrels, Relining. Electroplating Worn Machine Gun Barrels, W. W. de Sveshnikoff and H. E. Haring. Army Ordnance, vol. 5, no. 26, Sept.-Oct. 1924, pp. 503-504 and 544, 5 figs. Details of experiments conducted by authors in 1921 to determine whether a plating process could be used to reline machine-gun barrels. Results indicate that with information and methods then available process was not practicable. Pub. by permission U. S. Bur. Standards.

Nickel. See NICKEL PLATING.

Phonograph Matrices. The Manufacture of Phonograph Matrices, S. Wein. Metal Industry (Lond.), vol. 25, no. 19, Nov. 7, 1924, pp. 447-448. Describes technique of specific methods commonly used in two plants.

Research Department. Plating Research of the Bridgeport Brass Company, J. L. Christie. Metal Industry (N. Y.), vol. 22, no. 12, Dec. 1924, pp. 485-487, 1 fig. How research department helps plating department to increase and improve production.

Silver. See SILVER PLATING.

Silver Sheet Anodes, Blackening of. The Blackening of Silver Sheet Anodes, T. B. L. Cain. Metal Industry (Lond.), vol. 24, no. 25, June 20, 1924, pp. 593-594. Points out that there is much reason for belief that sulphur, as impurity in cyanide, is largely, if not wholly, responsible for this trouble of blackening of silver sheet anodes. Describes process of a simple preliminary treatment of cyanide, by means of which suitable purification is obtained.

Solutions. Studies on Electro-Plating, W. E. Hughes. Metal Industry (Lond.), vol. 24, nos. 7, 8, 9, and 10, Feb. 15, 22, 29, and Mar. 7, 1924, pp. 145-147 and 158, 169-170, 194-196, and 218-220. Composition of plating solutions.

Tungsten on Iron. An Attempt to Electroplate Tungsten on Iron, C. A. Mann and H. O. Hal-

vorsen. Am. Electrochem. Soc.—Advance Paper no. 2, for meeting Apr. 24-26, 1924, pp. 13-27, 1 fig. Investigation made to produce satisfactory electroplate of tungsten on iron and to study behavior of tungsten under different electrolysis conditions.

Zinc. See ZINC PLATING.

ELECTROSTATICS

Analytical Treatment of Problems. The Analytical treatment of the Fundamental Problems of Electrostatics (Die analytische Behandlung der Fundamentalprobleme der Elektrostatik), K. Hilebrand. Physikalische Zeit., vol. 25, no. 1, Jan. 1, 1924, pp. 8-13. Proposals of C. Neumann of so-termed element considerations and element potentials and their applications by him to plane curves, are now shown to afford, on rational application to three-dimensional space, possibility of solving in general manner fundamental problems of electrostatics, i. e., equilibrium distributions upon conductors of any given form; paper is mathematical throughout.

ELEMENTS

Atomic Concentration. Relations between the Atomic Concentration and the Mechanical, Thermal and Optical Constants of the Elements (Sur des relations entre la concentration atomique et des constantes mécaniques thermiques et optiques des éléments), P. Lasareff. Academie des Sciences—Comptes Rendus, vol. 178, no. 21, Mar. 19, 1924, pp. 1716-1718. Gives relations for a number of metals.

Chemical. The Systematic Detection of the Rarer Chemical Elements, A. A. Noyes and W. C. Bray. Chem. Revs., vol. 1, no. 3, Oct. 1924, pp. 277-291. A systematic, universally applicable scheme of qualitative analysis which includes as nearly as practicable all metal-forming elements, and which makes possible their detection when present in small quantity, even in association with large quantities of any other elements.

Disintegration of. See ATOMS, Structure of.

Metallic. See METALS.

Non-Metallic. The Non-Metallic Elements. Connexions between their Dielectric and other Physical Properties, G. L. Addenbrooke. Lond. Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 281, May 1924, pp. 945-965, 1 fig. Consideration of two actions taking place when dielectric is placed in electric field; relation of attraction to energy reversibly stored; comparison of relative electric values found with relative values of other physical properties; comparison of electric actions with absolute melting points and with absolute boiling points; relation of relative molecular electric actions to heat of vaporization; relations with surface tensions; comparison with capillarity, etc.

Spectra, Ultra-Violet. On the Ultra-Violet Spark-Spectra of some of the Elements, R. J. Lang. Roy. Soc. Lond.—Philosophical Trans., vol. 224, no. A624, 1924, pp. 371-419, 4 figs. partly on supp. plates. Details of investigation on extreme ultra-violet spectra of a number of elements. and results obtained.

Study of. See ATOMS, Structure.

ELEVATED RAILWAYS

Car-Truck Repair. Repairing Motor Trucks for Subway and Elevated Railways, F. H. Colvin. Am. Mach., vol. 61, no. 22, Nov. 27, 1924, pp. 843-845, 5 figs. Methods employed at repair shop of N. Y. Rapid Transit Corpn. in Brooklyn; running truck under raised cars by their own power; special clamps for lifting trucks by wheels.

Cars. Passenger Comfort the Feature of the New Chicago "L" Cars. Elec. Ry. Jl., vol. 63, no. 2, Jan. 12, 1924, pp. 55-59, 6 figs. Describes steel motor cars recently put in service by Chicago Elevated R. R.; low first cost and maintenance; plush seats, liberal ventilation, and insulation against noise and cold; wood roof necessary for overhead trolley.

Germany. Remarkable Construction Work in the Berlin and Hamburg Elevated Railways (Bemerkenswerte Bauausführungen bei der Berliner und Hamburger Hochbahn), M. Kress. Bautechnik, vol. 2, no. 37, Aug. 29, 1924, pp. 408-412, 11 figs. Reinforced concrete construction, tunneling under houses and rivers, etc.

Subways, Surface Lines and. Elevated Railways. Ry. Engr., vol. 45, no. 537, Oct., 1924, pp. 359-363, 10 figs. Comparison between surface lines, elevated railways and subways. Elevated railway in Philadelphia.

ELEVATORS

Construction. Progress in Elevator Construction (Fortschritte im Aufzugsbau), Braun. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 21, Nov. 15, 1924, pp. 199-200. Discusses increased speed in operation and safety, steel for elevator guides, compressed-air for braking, safety devices, etc.

Drum-Type Machine. Operation of Electric Elevator Machines—Drum-Type Equipment, F. A. Annett. Power, vol. 60, no. 16, Oct. 14, 1924, pp. 609-612, 5 figs. Describes different classes of elevator machines in use and operation of drum-type machine both for overhead and basement installations.

Electric. The New Regulations of the Swiss Society of Engineers and Architects for Elevators and Lifts (Quel est le but des nouvelles prescriptions de la S. I. A. concernant les installations d'ascenseurs et de monte-charges?), A. Bernheim. Bulletin Technique de la Suisse Romande, vol. 50, no. 14, July 5, 1924, pp. 176-179, 1 fig. Critical review of new regulations showing their shortcomings and suggesting improvements.

Electric, Operation of. Operation of Electric Elevator Machines—General Principles, F. A. Annett. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 414-416, 6 figs. Explains operation of semi-magnetic controlled elevators, describes the different automatic stopping devices, and tells how to adjust terminal landing limits.

Gearless Traction Motor and Brake. Mechanical Features of the Gearless Traction Elevator Motor and Brake, J. J. Matson. Gen. Elec. Rev., vol. 27, no. 6, June 1924, pp. 390-394, 7 figs. Shows how manufacturer's engineers have made thorough study of each part and developed a capable elevator hoist.

Grain. See GRAIN ELEVATORS.

Hand and Power. The Design and Construction of Hand and Power Elevators. Mech. Wld., vol. 75, nos. 1932, 1934, 1937, and 1939, Jan. 11, 25, Feb. 15, and 29, 1924, pp. 24-25, 49-51, 98-100, and 129-130, 13 figs. Deals with elevators for raising or lowering goods of solid form between basement and intervening floors of a building or factory.

Passenger. Electric Passenger Lifts, H. Marrayat. Instn. Elec. Engrs.—Jl., vol. 62, no. 328, Apr. 1924, pp. 325-341, and (discussion) 341-349, 12 figs. Plea for British investigation and design in order to produce elevator more especially suitable to conditions in England than is possible by following American practice too closely; outlines methods employed by author in calculating elevator capacity required in building; comparison between drum and sheave driving; refers to new system of control, called auto-pilot; safety devices.

Passenger, Time-Velocity Characteristics. Time-velocity Characteristics of the High-speed Passenger Elevator, Bassett Jones. Gen. Elec. Rev., vol.

27, no. 2, Feb. 1924, pp. 111-120, 5 figs. Discusses psychology of elevator passenger, physiological effect of acceleration and retardation on him, possible improvements in service through increased car velocity, quicker gate and door operation, better signal systems, and use of automatic stops; discusses velocity and advances method of analyzing time-velocity relations assisting in designing high-grade high-speed elevator installations.

Standardization. Elevators Are Being Standardized, A. G. McLaughlin. Contract Rec., vol. 38, no. 47, Nov. 19, 1924, pp. 1147-1149. Manufacturers are developing machines adapted to every condition of building construction. Entire equipment is being made to conform to standards. Typical elevator arrangements.

Standards. Purpose of the S. I. A. Regulations for Construction and Operation of Elevators (Was bezwecken die S. I. A.-Vorschriften für Einrichtung und Betrieb von Aufzügen?), A. Bernheim, Jr. Schweizerische Bauzeitung, vol. 83, no. 24, June 14, 1924, pp. 280-284, 1 fig. Review of standards by S. I. A. commission, suggesting further improvements and more stringent regulations.

Swinging-Cradle Type. Swing- or Finger-tray Elevator for Handling Fresh Fruit in Crates, Barrels and Cases, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 16, Oct. 1924, pp. 445-447, 3 figs. Describes swinging-cradle type of elevator, great size of which is necessary in order to accommodate largest crates and barrels in which fruit is imported; consists of five parts, viz., main steel structure, two endless chains, cradles, feeding-on and delivering-off gear.

Variable-Voltage Control. Variable Voltage Control Systems as Applied to Electric Elevators, E. M. Bouton. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 52-63, 16 figs., and (discussion) in no. 11, Nov. 1924, pp. 1070-1081, 11 figs. Conclusions in favor of variable-voltage over rheostatic-control system, with regard to speed, acceleration and retardation, speed control and regulation, efficiency and economy of power consumption, maintenance, and safety.

Winding-Machine Manufacture. Building Electric Elevator Winding Machines, H. P. Armson. Can. Machy., vol. 31, no. 12, Mar. 20, 1924, pp. 15-18, 5 figs. Machine shop practice utilized in speeding production at plant of Turnbull Elevator Co., Toronto, Can., in manufacturing electric geared traction elevator equipment.

EMERY

Peekskill, N. Y. Peekskill District Now Supplies American Emery Ore Exclusively. Abrasive Industry, vol. 5, no. 3, Mar. 1, 1924, pp. 65-66, 1 fig. Analysis of Peekskill (N. Y.) emery and notes on method of working.

EMPLOYEES

Compensation. See WORKMEN'S COMPENSATION.

Individual Differences of. What Makes Employees Differ? D. A. Laird. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 184-190, 5 figs. Discusses from point of view of present-day science factors connected with individual differences with which empolyer should be familiar.

Inventions of. See INVENTION; INVENTIONS.

Ownership, Economics of. Broad Economics of Employee Ownership, T. N. Carver. Elec. Ry. Jl., vol. 64, no. 15, Oct. 11, 1924, pp. 613-616. Points out that employee ownership is especially desirable with public utilities; modern business improves by increasing rather than by decreasing supply of capital. Abstract.) Paper read before Am. Elec. Ry. Assn.

Rating Scales. Personal Opinion Records and Rating Scales, Henry C. Link. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 78-80, 1 fig. Suggestions for simple rating system; points out value of system of recording personal opinions as substitute for or supplement to more objective production records.

Recording Worker's Personality. Recording the Worker's Personality, D. A. Laird. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 307-314, 13 figs. Going beyond working record in promoting employees, that is, supplementing records of employee's work with records which will furnish key to his personality.

Relations with. See INDUSTRIAL RELATIONS.

Representation. See EMPLOYEES' REPRESENTATION.

Vacation Plans for. Vacation Plans for Wage Workers. Iron Age, vol. 114, no. 23, Dec. 4, 1924, pp. 1471 and 1517-1518. Information obtained from large number of manufacturers in 26 states and Canada; various methods adopted. Compiled by Indus. Relations Staff, Curtis, Fosdick & Belknap, Attorneys, New York.

EMPLOYEES' REPRESENTATION

Czechoslovakia. Operation of Works Committees in Czechoslovakia, 1922. Monthly Labor Rev., vol. 19, no. 1, July 1924, pp. 44-47. New law on German model applying to establishments of at least 30 employees does not find much favor. Translated from Soziale Praxis and Archiv für Volkswohlfahrt.

Examples of. Discussion on Employee Representation, A. H. Young. Iron Age, vol. 114, no. 12, Sept. 18, 1924, pp. 689-691. Some facts and factors which measure its success. Examples taken from periods of strife.

Railways. Employee Representation on the Railroads, H. C. Metcalf. Ry. Age, vol. 77, no. 24, Dec. 13, 1924, pp. 1062-1065. Suggestions for coöperation between employers and employees; forces shaping employee representation; relation between employee representation and trade unions; essentials of employee representation.

Work Councils. Shop Councils Develop Practical Co-operation. Ry. Age, vol. 77, no. 4, July 26, 1924, pp. 153-155, 1 fig. Particulars of plan of Union Pacific System which meets with approval of officers and men alike.

EMPLOYEES, TRAINING OF

Coöperative Education. Training the Future Employee Through Cooperative Education, H. H. Bliss. Jl. of Electricity, vol. 52, no. 6, Mar. 15, 1924, pp. 205-206. Describes plan which is being widely adopted in the West, in which firms cooperate with college in training future leaders of industry; includes alternate monthly periods of study and employment, coördinated so that work serves practically as laboratory part of a unified course of training.

Evening School. Helping the Worker by Education, S. W. Ashe. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 524-525. How evening school at Pittsfield Works of Gen. Elec. Co. provides educational opportunities for employees.

Foremen. A Successful Experiment in Industrial Education, D. J. Roach. Chem. & Met. Eng., vol. 31, no. 7, Aug. 18, 1924, pp. 272-273. How one large company is training its foremen and operating bosses in economics, mathematics, and technology of its industry.

See also FOREMEN, Training.

Locomotive Drivers. Note on the Reorganisation of Technical Instructions for Enginemen on the Belgian State Railways, N. Rulot and E. Hennig. Int. Ry. Congress Assn.—Bul., vol. 6, no. 4, Apr. 1924, pp. 247-268, 11 figs. Reorgan-

ization comprises a series of measures tending to: arrange for classes to be sufficiently frequent and continuous, working at same time to a plan; as far as possible to specialize as regards instructors; and improve, complete, and make uniform apparatus used in class rooms.

Railway, in Air-Brake Equipment. Instructing Railway Employes in Air Brake Equipment, J. P. Stewart. Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1131-1132. Methods of interesting and instructing employees in operation and maintenance of air-brake equipment; value of instruction cars and instruction rooms; class construction preferred. (Abstract.) Paper read before Air Brake Assn.

Railway-Shop. See RAILWAY SHOPS, Training of Forces.

EMPLOYMENT MANAGEMENT

Apprentices, Placing of. Connection Between Suitability Tests and Observation of Capability in Apprentices in the Metal Industry (Zusammenhänge zwischen Eignungsprüfung und Leistungsbeobachtung in der Praxis bei Lehrlingen der Metallindustrie), R. Bolt. Maschinenbau, vol. 3, no. 13, Apr. 10, 1924, pp. 450-454, 5 figs. Discusses practice at Siemens Schuckert Works for placing apprentices according to ability.

Central Stations. Power Plant Personnel, K. W. Stillman. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 633-636, 5 figs. Selection, training, and promotion of steam-power-station employees.

Employee Specifications. Employee Specifications, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 68, no. 2, Aug. 1924, pp. 115-118. Establishing standards similar to those used in purchase of materials.

Employee's Industrial Past. The Employee's Past, D. A. Laird. Indus. Mgmt. (N. Y.), vol. 68, no. 3, Sept. 1924, pp. 152-160, 11 figs. Value of dispassionate records in employment work.

Labor Distribution. The Decimal Method of Labor Distribution, Jos. M. Schappert. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, p. 98. Advantages of decimal system over common fraction method; outline of decimal system which may be established to betterment of labor costs in almost any organization.

Labor Policy. Work of the Industrial Executive, B. A. Franklin. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 611-614. Practical points on labor policy.

Labor Turnover. See LABOR TURNOVER.

Personal-Interview Method. Pitfalls of the Employment Interview, D. A. Laird. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 58-62, 4 figs. Pitfalls of personal interview employment procedure, and suggestions for eliminating them.

Physiological Examination. Functions of Physiology in the Science of Work (Die Aufgaben der Physiologie in der Arbeitswissenschaft), E. Atzler. Technik u. Wirtschaft, vol. 17, no. 8, Aug. 1924, pp. 173-180, 7 figs. Discusses physiological, in addition to medical, examination to determine suitability of work and rational work, and gives examples of turning cranks and lifting weights.

Practical Psychology. Psychology Dons Overalls, D. A. Laird. Indus. Mgmt. (N Y), vol. 67, no. 4, Apr. 1924, pp. 204-211, 4 figs. Economic value of practical psychology in industry; insight into practical workings of economic psychology, stripped of its all too often encountered charlatan trappings.

Promotion Methods. Methods of Promoting Industrial Employees, P. F. Gemmill. Indus. Mgmt. (N. Y.), vol. 67, no. 4, Apr. 1924, pp. 235-247. Research into and analysis of methods of 130 representative industrial concerns.

Promotion Policy. Reducing Labor Turnover by Promotion, K. H. Condit. Am. Mach., vol. 60, no. 15, Apr. 10, 1924, pp. 539-541, 2 figs. Seventh article in Gilbreth series describing personnel policy; doing away with blind-alley jobs; helping employee to reach highest position he can hold.

Psychological Tests. See PSYCHOLOGICAL TESTS.

Railways. Inspection of Periodic Examinations of Physical and Psychical Faculties of Operators (Surveillance des examens périodiques des facultés physiques et psychiques des agents), L. Bacqueyrisse. Industrie des Tramways, vol. 18, no. 215, Nov. 1924, pp. 448-476, 13 figs. Report presented to Int. Congress in Paris. Deals with conditions of employment from points of view of age, sex, and physical conditions; alcoholism and how to reduce its effects.

See also RAILWAY OPERATION, Personnel Work.

Rating Shop Employees. A Practical System for Rating Shop Employees, A. H. Rodrick. Factory, vol. 32, no. 1, Jan. 1924, p. 32, 1 fig. Describes system of marking efficiency of shop employees used in shops of Naval Torpedo Station.

Selecting Employees. Picking Competent Molders, R. J. Waldo. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 307-309, 3 figs. Exacting methods for determining applicant's fitness to fulfill position recognized as desirable; trade test method of interviewing prospective employees successful in choosing men for foundry work.

The Industrial Psychology of Individual Differences, D. A. Laird. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 71-77, 14 figs. Discusses basic facts for selecting workers.

Service Department. Organizing Personnel Work in a Textile Mill, E. C. Gould. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 280-282. Describes plan of service department of a Lowell textile mill, designed to give mill executives responsibility for initiating and carrying out ideals of satisfactory industrial relations.

EMULSIFICATION

Theory of. The Theory of Emulsification, P. Finkle, H. D. Draper and J. H. Hildebrand. Leather Chemists Assn.—Jl., vol. 19, no. 4, Apr. 1924, pp. 197-207. Present status of theory of emulsification; types and relative stabilities of emulsions formed by aid of various soaps explained by aid of theory of orientation of soap molecules in interface; experimental data upon type and relative stabilities of emulsions of various liquids with water.

EMULSIONS

Oil, Methods of Destroying. Methods of Destroying Oil Emulsions, L. A. Gurvic. Petroleum & Oil-Shale Industry, vol. 5, no. 11-12, Nov.-Dec. 1923, pp. 613-619. Enumerates chief methods employed and considers them theoretically, namely, mechanical, physical, and physico-chemical methods; concludes that no one method is universally applicable, different emulsions requiring different treatment; proposed establishing central experimental station for determining best method to be employed in every given case. (In Russian, with brief abstract in English.)

Separators. The "Metan" Crude Oil Emulsion Separator (Rohölemulsion-Abscheider "Metan"), L. Burek. Petroleum, vol. 20, no. 34, Dec. 1, 1924, pp. 1887-1891, 3 figs. Details of process and apparatus for separating crude oil and emulsion, in which crude is fed continuously under pressure through a preheating system with a vertical tank, where emulsion particles remain long enough for separation of phases to be carried out.

ENAMELING

Automobiles. Low-Bake Automobile Body Enamels, C. R. Bragdon. Automotive Mfr., vol. 66, no. 5, Aug. 1924, pp. 8-9. Discusses advantages of this form over others; durability, economy, simplicity of operation plus beauty and color variety equal to paint and varnish. Abstract of paper read before Detroit Body Builders' Convention.

Process of and Equipment for Fender and Body Enameling, G. Lefebvre. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 195-208, 26 figs. Improvements in mechanical equipment and processes employed in various car-assembling plants of large automobile building company, with special attention to processes for enameling fenders and sheet-metal parts and such small parts as various stampings, forgings and malleables.

Cast-Iron Ware. European Practice in the Manufacture of Enameled Cast Iron Ware, J. Grunwald. Am. Ceramic Soc.—Jl., vol. 7, no. 2, Feb. 1924, pp. 118-121. Review of European practice, particularly as employed in Austria and Germany.

Cooking Utensils, Manufacture. Manufacturing Enameled Ware Utensils, F. G. White. Blast Furnace & Steel Plant, vol. 12, no. 2, Feb. 1924, pp. 124-126, 4 figs. See also Forging—Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 43-45, 4 figs. Methods employed at Granite City factory of Nat. Enameling & Stamping Co.; quality of steel and careful annealing and pickling are essential to successful enameling of cooking utensils; removal of die lubricant.

Electric Furnaces for. Enameling Cast-Iron Ware In Electric Furnaces, H. E. Kennedy. Chem. & Met. Eng., vol. 30, no. 5, Feb. 4, 1924, pp. 219-221, 5 figs. Advances in construction and disposition of metallic resistors have simplified use of electricity for this purpose.

Electric Ovens for. Electric Japanning, H. Allen. Am. Electrochem. Soc.—Advance Paper, for meeting Oct. 2-4, 1924, pp. 443-450. Review of development of electrically heated enameling ovens and progress made in art of enameling automobile parts at Dodge motor-car plant.

Fish Scaling in. Principles of Enameling, H. F. Staley. Ceramist, vol. 4, no. 6, Sept. 1924, pp. 351-362. Fish scaling in enamels on sheet steel and iron.

Furnaces. See ELECTRIC FURNACES, Enameling.

Principles. Principles of Enameling, H. F. Staley. Ceramist, vol. 4, nos. 1, 2, 3, 4, and 6, and vol. 5, nos. 1 and 2, Apr., May, June, July, Sept., Oct., and Nov. 1924, pp. 6-14, 87-98, 167-178, 229-236, 351-362, 29-35, and 96-104, 1 fig. Apr.: Calculation of melted weight, percentage loss on melting and coefficient of expansion of enamels without use of chemical symbols. May: Feldspar problem in enamel making. June: Specifications for feldspar. July: Calculation of percentage composition of melted enamels without use of chemical symbols. Sept.: Fish scaling in enamels on sheet steel and iron. Oct.: Effect of size of grain of feldspar on melting of enamels. Nov.: Relative accuracy of Schott, and English and Turner factors for coefficients of thermal expansion of enamels.

Sheet-Iron and Steel Warpage. Factors Affecting the Warpage of Sheet Iron and Steel in Enameling, R. R. Danielson, T. D. Hartshorn and W. N. Harrison. Am. Ceramic Soc.—Jl., vol. 7, no. 5, May 1924, pp. 326-341, 7 figs. Effects upon warpage of different methods of cleaning metal, duration of firing periods, scaling practices, gages of metal, types of enamel, etc., are studied.

Sheet Metal for Vitreous. The Development of Sheet Metal for Vitreous Enameling, Jas. A. Aupperle and How. E. Brooks. Ceramist, vol. 4, no. 5, Aug. 1924, pp. 294-303, 8 figs. Discusses use of Armco ingot iron in vitreous-enameling industry.

Smelters. Types of Enamel Smelters, J. E. Hansen. Fuels & Furnaces, vol. 2, no. 2, Feb. 1924, pp. 141-144, 2 figs. Reverberatory and rotary smelters; experimental types.

Steel Cleaning. Cleaning Steel For Enameling. Fuels & Furnaces, vol. 2, no. 4, Apr. 1924, pp. 383-384. Tank versus scaling methods for removing greases and oils in enameling plants.

ENAMELS

Automobile Bodies. See AUTOMOBILES, Bodies, Finishing.

Firing. The Effect of Furnace Atmosphere on the Firing of Enamel, R. D. Cooke. Am. Ceramic Soc.—Jl., vol. 7, no. 4, Apr. 1924, pp. 277-281. Fragmentary data on firing of enamel, including reactions involved, relation of furnace space to area of enameling surface, etc.

Sheet-Steel. Effect of Zirconia in Enamels for Sheet Steel, H. G. Wolfram. Am. Ceramic Soc.—Jl., vol. 7, no. 1, Jan. 1924, pp. 1-13, 5 figs. Investigation concerned with essential properties of kitchen ware enamels. Results obtained from additions of zirconia to raw smelter batch of both ground and cover enamels, also from substitution of zirconia for tin oxide in mill batch.

ENERGY

Conservation. New Ways of Conserving Energy (Neue Wege der Energiewirtschaft), Löffler. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 8, Feb. 23, 1924, pp. 161-169, 18 figs. Present-day utilization of fuel energy; examples from mining and metallurgical, chemical and automotive industries; saving effected through high speed, high pressure and temperature drops; control of state of heat, especially through cooling; Diesel engines for trucks; electrical and mechanical power transmission in automobiles; gas and oil turbines; high-pressure steam turbines and boilers; use of high pressure and high temperature in chemical industry—refinement of fuel, liquefaction of coal; principles of modern high-pressure design and operation.

The Conservation of Energy (Energiewirtschaft) R. Reischle. Serial article in Zeit. des Bayerischen Revisions-Vereins, vol. 27, beginning June 30, and ending Dec. 31, 1923. Notes on different sources of energy and their utilization, with special consideration of conditions in Germany.

Transforming and Distributing. The Value of Efficiency in Transforming and Distributing Energy, Chas. E. Lucke. Mech. Eng., vol. 46, nos. 6 and 7, June and July 1924, pp. 317-324 and 380-385, 10 figs. Importance of energy costs; estimates of costs for primary energy and for its power-plant transformation into electrical energy through appropriate steps.

Utilization of Natural Sources. Contribution to the Theory of the Utilization of Natural Power Sources (Beitrag zur Theorie der Ausnützung von Naturkräften), Rob. I. Novotny. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 5, Feb. 2, 1924, pp. 101-106, 11 figs. Influence of working time and idleness of power plant on utilization of energy contained in a natural power source; improving power utilization and increasing efficiency by use of energy storage; comparison of cost of power generation with and without storage of energy.

ENGINEERING

Chemical Industry. Chemical Engineering in Industry, H. C. Parmelee. Chem. & Met. Eng., vol. 31, no. 6, Aug. 11, 1924, pp. 218-222. Review of development of profession, estimate of its present status and its responsibilities and extrapolation to future.

Electrical. A Hundred Years of Electrical Engineering, G. W. O. Howe. Engineering, vol. 118, no. 3058, Aug. 8, 1924, pp. 193-195. Briefly reviews developments and present position from Faraday's electro-motor. Abstract of paper read before Eng. Sec., British Assn. at Toronto.

Human Factor in. The Human Factor in Engineering, S. C. Godfrey. Military Engr., vol. 16, no. 87, May-June 1924, pp. 180-183, 1 fig. Discusses "human engineering" or treatment of human tools with as much consideration as materials; including workers' councils, etc.

Literature. Engineering Literature, D. McNicol. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 131-135. Critical review of tendencies in technical literature, with statement of some of problems of publication.

Mechanical, in Military Service. The Progress of Mechanical Engineering in the Military Service, G. LeQ. Martel. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1924, pp. 101-138, 9 figs. Brief historical survey of work of mechanical engineer in army up to outbreak of world war; how work of mechanical engineer was organized and carried out during war and progress made since war; account of work in connection with repair of munitions of every kind in field.

ENGINEERING FOUNDATION

Activities. Some Work Done by Engineering Foundation, Alfred D. Flinn. Boston Soc. Civ. Engrs.—Jl., vol. 11, no. 8, Oct. 1924, pp. 376-379. Facts of its activities.

ENGINEERING SOCIETIES

American Engineering Council. The Work of the American Engineering Council, L. W. Wallace. La. Eng. Soc.—Proc., vol. 10, no. 4, Aug. 1925, pp. 203-213. Purpose of organization is to be agency through which engineering profession may render an essential public service; what Council has been doing; classification and compensation of government employees; government reorganization.

ENGINEERS

Compensation of. Compensation of Practicing Engineers: A Critical Study, C. L. Bogert. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1103-1105. Merits and disadvantages of various systems of payment for service. Per diem basis for purely consulting practice and bonus and penalty for other independent work recommended.

Coal Mining. See COAL MINES, Engineers, Opportunities for.

Consulting. The Costs of a Consulting Engineering Practice. Engineer, vol. 137, no. 3553, Feb. 1, 1924, pp. 113-114, 2 figs. Author points out importance of having accurate knowledge of costs of consulting-engineering practice and gives results of his own experience.

Ethics Code. Advances in Engineering Ethics, C. E. Drayer. Professional Engr., vol. 9, no. 10, Oct. 1924, pp. 13-15. Code of ethics drafted by national technical societies; case method of engineers' applied ethics; specific principles of good professional conduct; relations of engineers to employees and to other engineers.

Highway, Training of. Technical Training for Highway Engineers, R. DeL. French. Can. Engr., vol. 47, no. 2, July 7, 1924, pp. 141-142. Shows why highway engineer needs thorough and careful training; natural qualities necessary in student; three divisions of highway engineering course are technical, financial, and economical.

Low Salaries, Cause of. What Is the Matter with Engineering? G. M. Butler. Professional Engr., vol. 9, no. 12, Dec. 1924, pp. 10-12 and 18. Refers to low engineering salaries paid to experienced engineers, and to misleading and vicious advertising.

Mathematics and. See MATHEMATICS, Engineering.

Public Obligations. The Engineer: His Abilities and His Public Obligations, John L. Harrington. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 31-34. Need of engineer in Government; shortcomings of present educational system; engineer and transportation problems; engineer and public business; licensing and status of engineering profession.

Refrigerating, Relation to Employer. Relation of the Engineer to His Employer, W. S. Vivian. Ice & Refrigeration, vol. 66, no. 1, Jan. 1924, pp. 12-16. Qualifications of engineer.

Relation to Finance. The Engineer's Relation to Finance, L. W. Mayer. Min. & Metallurgy, vol. 5, no. 208, Apr. 1924, pp. 163-167. Why engineering profession does not rank higher; confidence in engineer held by banker; points out that there are more failures owing to poor financing than to poor engineering, and that financier underestimates degree of engineer's assistance.

Responsibility of. The Engineer's Responsibility, M. Knowles. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 4, May 1924, pp. 143-158 and (discussion) 159-162. Definition of engineer; public influence of engineering work; distribution of responsibility; what engineer can do for himself; directing public opinion; etc.

Social Challenge to. The Social Challenge to the Engineer, Geo. A. Horne. Refrig. Eng., vol. 11, no. 6, Dec. 1924, pp. 200-201 and 207. Points out that social needs of humanity should constitute challenge to all groups, and that engineer by training and by occupation is peculiarly adapted to accept this social challenge as one in which he can play important part in bringing to pass the desired result; he can interpret findings of science and translate them into practical ways of usefulness for benefit of mankind.

Tasks and Future. The Imperfect Art of Enginering, F. C. Wright. Cornell Civ. Engr., vol. 32, no. 8, May 1924, pp. 107-110. Popular misconception of engineer and his work; tasks of engineer; points to stress in learning profession.

Training. The Training of Works Students (Praktikantenausbildung), J. Hanner. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 569-573. Length of training course; training in and outside of shop.

ENGINEHOUSES

[See also TERMINALS, LOCOMOTIVE.]

Concrete Rectangular. England's First Reinforced Enginehouse, D. R. Lamb. Ry. Age, vol. 76, no. 5, Feb. 2, 1923, pp. 327-340, 8 figs. Southern Railway completes rectangular structure of novel design at Feltham, England.

Lighting. Roundhouse Lighting on the Elgin, Joliet & Eastern, A. W. Ryan. Ry. Elec. Engr., vol. 15, no. 7, July 1924, pp. 222-224, 6 figs. All conduit for lighting placed in concrete pillars or floor; single lead-covered conductor for welding distribution.

See also RAILWAY SHOPS, Lighting.

Turntables. A Remarkable Record in a Turntable Renewal, Ry. Age, vol. 76, no. 37, June 21, 1924, pp. 1759-1761, 5 figs. Southern Pacific

bridge crews replace 70-ft. structure with 100-ft. in 1 hr. 46 min.

New Turntable Installed in Record Time. Ry. Rev., vol. 74, no. 26, June 28, 1924, pp. 1241-1244, 7 figs. Southern Pacific Co. bridge and building forces replace old 35-ton, 70-ft. deck girder turntable by 90-ton, 100-ft. steel truss table in 1 hr. 46 min.

The Bethlehem Twin-Span Turntable. Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, pp. 357-359, 4 figs. Describes adaptation of rigid fulcrum to purposes of turntable.

Types of Turntable Developed for Heavier Locomotives. Eng. News-Rec., vol. 92, no. 23, June 5, 1924, pp. 964-967, 6 figs. Continuous and 2-span tables replace cantilever type; larger and heavier locomotives introduce problems not present with light power; lower maintenance cost and quicker operation.

Unusually Quick Installation of Longer Turntable, H. S. Clarke. Ry. Rev., vol. 74, no. 14, Apr. 5, 1924, pp. 644-649, 9 figs. Delaware & Hudson Co. replaces balanced turntable with longer twin span table in remarkably short time.

Wiring and Lighting. Enginehouse Wiring and Lighting on the Santa Fe. Ry. Elec. Engr., vol. 15, no. 1, Jan. 1924, pp. 13-16, 4 figs. Wires carried in lead-coated wrought-iron water pipe, and both wall and overhead types reflectors used; threads and fittings lead coated by wiremen.

ENGRAVING MACHINES

Design. Design of Engraving Machines, L. Braren. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 663-668, 13 figs. Principles underlying operation of different designs of engraving machines; describes various forms of pantographic mechanisms; different types of cutters and machines employed in European practice.

Engraving Machines (Graviermaschinen), L. Braren. Werkstattstechnik, vol. 18, no. 3, Feb. 1, 1924, pp. 47-51, 15 figs. Study of construction elements peculiar to such machines and information on a number of new solutions of problems involved.

ENTROPY

Absolute-Value Calculation. Calculation of Absolute Value of Entropy by Means of Third Law of Thermodynamics (Die Berechnung des absoluten Wertes der Entropie mit Hilfe des 3. Wärmesatzes), Schmolke. Wärme, vol. 47, no. 40, Oct. 3, 1924, pp. 465-468, 1 fig. Shows under what conditions third law may be used for determination of entropy.

Diagram for Ammonia. See AMMONIA, Temperature-Entropy Chart.

Diagram for Internal-Combustion Engine. See INTERNAL-COMBUSTION ENGINES, Temperature-Entropy Diagram.

EOTVOS TORSION BALANCE. See PROSPECTING, Electrical.

ESCALATORS

Italy. Escalators for the Urban Station in Naples of the Direct Rome-Naples Line (Scale mobili per il tratto urbano in Napoli della linea direttissima Roma-Napoli), E. D'Andrea. Rivista Tecnica delle Ferrovie Italiane, vol. 25, nos. 5 and 6, May 15 and June 15, 1924, pp. 159-170 and 208-212, 8 figs. Details of design of escalators at stations of Montesanto and Piazza Cavour, also escalators in London stations.

ETHER

Theory. On the Subject of Ether (Au sujet de l'éther). G. Moressée. Revue Universelle des Mines, vol. 3, no. 2, series 7, July 15, 1924, pp. 62-104, 11 figs. Discusses mechanism of waves, calculation and laws of very short waves, solar energy, calorific waves, effect of longitude.

ETHICS

Engineers' Code. See ENGINEERS, Ethics Code.

ETHYL CHLORIDE. See REFRIGERANTS, Ethyl Chloride.

EVAPORATION

Air-Current. The Effect of a Current of Air on the Rate of Evaporation of Water Below the Boiling Point, G. W. Himus and J. W. Hinchley. Chem. & Industry, vol. 43, no. 34, Aug. 22, 1924, pp. 840-845, 11 figs. Deals with certain aspects of evaporation of water in currents of air and treats of evaporation from water surfaces at different temperatures under varying conditions of draft.

Compression Method. Evaporation by Compression (Druckverdampfung), K. Tschaskalik. Wärme- u. Kälte-Technik, vol. 26, nos. 20, 21, and 23, Oct. 15, Nov. 1, and Dec. 1, 1924, pp. 187-189, 194-195, and 218-219, 5 figs. Discusses three-stage evaporation without condenser and its application in sugar industry.

Heat of. Heat of Vaporization, A Function of the Temperature, M. M. Green. Am. Chem. Soc.—Jl., vol. 46, no. 3, Mar. 1924, pp. 544-545. Calculation devised to show that if heat of vaporization is assumed to be function of temperature alone, the same function is to be used for all substances but differing in constants involved; conclusion is arrived at which indicates approximate limits of accuracy of such relation.

The Heat of Vaporization and the Pressure of Saturated Vapor at Very Low Temperatures (Ueber die Verdampfungswärme und den Druck gesättigter Dämpfe bei sehr niedrigen Temperaturen), A. Brandt. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 406-408, 3 figs. Discussion of theorem of Nernst, Clapeyron's equation, and deduction thereof by E. Ariès.

See also LIQUIDS, Heat of Evaporation.

Liquids. See LIQUIDS, Evaporation.

Water. Evaporation of Small Drops of Water (Die Verdampfung kleiner Wassertropfen), N. Gudris and L. Kulikowa. Zeit. für Physik, vol. 25, no. 2, July 2, 1924, pp. 121-132, 6 figs. Experiments with drops of 10^4 to 10^5 cm. diameter show that with increasing difference of $p_k - p_0$, velocity of evaporation increases; by reducing tension above drop the evaporation process may be retarded or even reversed so that drop will increase in volume.

EVAPORATORS

Chemical Plants. Heating an Evaporator with the Exhaust from Condensing Engines, F. H. Nickle. Chem. & Met. Eng., vol. 31, no. 6, Aug. 11, 1924, pp. 226-228, 3 figs. Device designed to act as condenser for multi-expansion engines and evaporator for chemical plant service at same time.

Continuous-Flow. The Continuous Flow Evaporator, M. C. Stuart. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 1, Feb. 1924, pp. 55-65, 7 figs. Describes new evaporator, design of which embodies novel features improving purity, capacity, economy and operation.

Heat Balance, Adaptation to. Adapting Evaporators to Heat Balance, E. H. Chapin. Power Plant Eng., vol. 28, nos. 10 and 11, May 15 and June 1, 1924, pp. 534-536 and 588-591, 18 figs. May 15: Vital features of evaporator design.

June 1: Heat balance of cycles in which evaporation is accomplished with steam extracted from main turbine.

Heat Transmission from. See HEAT TRANSMISSION, Evaporators.

Low-Pressure. Low-Pressure Evaporators, E. Ellsberg. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 3, Aug. 1924, pp. 434-465, 5 figs. Deals with submerged-coil type. Based on author's experience as planning and drafting superintendent at Navy Yard, Boston, in design, installation, and operation of low-pressure evaporators on several vessels of the Navy.

Multiple-Effect. Designing an Efficient Evaporator, H. K. More. Chem. & Met. Eng., vol. 30, no. 7, Feb. 18, 1924, pp. 274-278, 7 figs. Example of how fundamental principles underlying multiple-effect evaporation can be applied on commercial scale to industrial materials.

Refrigerants. Evaporating Systems for Refrigerants, W. F. Davis. Power Plant Eng., vol. 28, no. 4, Feb. 15, 1924, pp. 250-251. Points out that evaporators should have in a measure all general qualities of good steam boiler. (Abstract.) Paper read before Nat. Assn. Practical Engrs.

Steam-Jacketed, Heat Transfer in. Heat Transfer in Steam-Jacketed Evaporators, H. L. Olin, M. H. Dowell and C. M. Toynbee. Chem. & Met. Eng., vol. 31, no. 3, July 21, 1924, pp. 116-119, 3 figs. Determining overall transmission and film coefficients as well as operating efficiencies on plant equipment over a wide range of industrial conditions.

Sugar-Factory. Principles of Evaporation and Sugar Factory Evaporators, J. O. Frazier. Nat. Engr., vol. 28, no. 5, May 1924, pp. 204-208, 1 fig. Comments and historical data on development of evaporating apparatus for various purposes. Principles of multiple-effect evaporators. Temperature and pressure relations. Description of a standard multiple-effect evaporator and its operation.

See also SUGAR, Evaporators.

Types. An Economic Study of Evaporators, T. Fuwa. Chem. & Met. Eng., vol. 31, no. 5, Aug. 4, 1924, pp. 185-188, 2 figs. Cost of installation and operation of five general classes of evaporators and discussion of variable factors.

Evaporating and Drying Plant, S. G. Ure. Chem. & Industry, vol. 43, nos. 12, 14 and 15, Mar. 21, Apr. 4 and 11, 1924, pp. 294-303, 350-354, and 374-379, 22 figs. Types of evaporators; heat transference; single- and multiple-effect evaporators; thermo-compression; chemical action; adsorption; addition or removal of heat; discontinuous and continuous dryers.

Evaporators Furnish Distilled Make-Up Water. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 485-488, 6 figs. Essential features of evaporators of different makes.

Vacuum. Calculation of Heating Surface for Vacuum Evaporators (Calcul des surfaces de chauffe dans les appareils d'évaporation sous le vide), Dessin. Arts et Métiers, vol. 77, no. 47, Aug. 1924, pp. 287-302, 8 figs. Principle of multiple-effect vacuum evaporators; determination of heating surface and coefficient of evaporation; temperature drop; apparatus of single, triple, and quadruple effect.

EXCAVATING MACHINERY. See CONSTRUCTION WORK, Machinery for; EXCAVATORS.

EXCAVATION

Drainage Ditches. See DRAINAGE, Ditches.

Earth. Large Scale Getting and Conveying in Earth Works (Massengewinnung und Förderung bei Erdbewegungen), G. Garbotz. Bauingenieur, vol. 5, no. 12 and 13, June 30 and July 15, 1924, pp. 371-376 and 397-401, 16 figs. Discusses machinery and methods for moving masses of earth, including dredges, excavators, track-moving machines. July 15: Tipping cars, automatic unloaders, etc.

Shovels. See SHOVELS.

Soil Characteristics. Characteristics of Quicksand and Other Soils Met in Ordinary Excavation, C. R. Gow. Boston Soc. Civ. Engrs.—Jl., vol. 11, no. 2, Feb. 1924, pp. 53-69 and (discussion) 69-79. Types of soil encountered and their characteristics.

Trenching Machines. See GAS MAINS, Trenching Equipment.

EXCAVATORS

Dragline. An Economic Study of Dragline Excavator Operation, C. W. Ullom. Eng. News-Rec., vol. 92, nos. 22 and 23, May 29 and June 5, 1924, pp. 932-934 and 976-979. Performance, operating practices, and costs determined by 13 million yards of excavation for Miami Valley flood-protection works. May 29: Output and cost records. June 5: Operating methods and costs.

200-Ton Dragline Excavator for the Sudan. Engineering, vol. 117, no. 3046, May 16, 1924, p. 636, 2 figs. on supp. plate. Excavator has bucket of 5 cu. yd. capacity and is mounted on 4 trucks of equalizing type, so that at times when wheels are on uneven surface frame still remains horizontal.

Electrically Operated. Electrically-Operated Navvy for the Morwell Power Scheme. Engineering, vol. 118, no. 3061, Aug. 29, 1924, p. 299, 2 figs. on p. 292. Brief description of exceptionally large and powerful navvy constructed by Ruston and Hornsby, Ltd., Eng., for State Elec. Commission of Victoria, Australia, which will be used for excavating brown coal for use in connection with Morwell power scheme for supplying electrical energy to Melbourne. Is of crane-navvy type; capable of making cut 75 ft. deep and 60 ft. wide.

Marl. Development of Marl Excavating Equipment, H. H. Musselman. Agricultural Eng., vol. 5, no. 12, Dec. 1924, pp. 273-274, 3 figs. Special agitator was developed consisting of rotating propeller-like cutter surrounded by large hood attached to end of suction pipe; hood was allowed to sink into marl which was agitated, mixed with water and pumped; tractor and 4-in. centrifugal pump were used for pumping.

Types. Excavators as Building Machines, E. Emmerich. Eng. Progress, vol. 5, no. 11, Nov. 1924, pp. 233-236, 3 figs. Machines for moving large masses of soil; bucket excavators; grab excavators; cable and dragline excavators.

EXECUTIVES

Clubs. See INDUSTRIAL MANAGEMENT, Executives' Clubs.

Control by. See INDUSTRIAL MANAGEMENT, Executive Control.

Cost Accounting for. See COST ACCOUNTING, Executives.

Mistakes Made by. Mistakes That Executives Make, C. E. Knoeppel. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 377-382. Deals with common, simple, yet disastrous, mistakes made in managing or organizing industrial plant.

Principles Governing. The Man and the Job, P. A. Fellows. Soc. Indus. Engrs.—Bul., vol. 6, no. 12, Dec. 1924, pp. 7-9. Principles governing the executive; points out that sense of perception and ability to make intelligent analysis of conditions are essential qualities of executive.

EXHAUST STEAM

Cost Calculation. How Shall We Calculate the Cost of Exhaust Steam? T. Fuwa. Chem. & Met. Eng., vol. 31, no. 4, July 28, 1924, p. 150. Comparison of four possible bases of evaluating exhaust steam and a discussion of advantages of each.

Utilization. Possibility and Advantages of Connecting Power and Heat in Industrial and Municipal Plants (Möglichkeiten und Vorteile der Kraft-Wärme-Kupplung in industriellen und öffentlichen Betrieben). Wärme, vol. 47, no. 17, Apr. 25, 1924, pp. 179-181. Discusses increased use of exhaust steam for heating and other purposes and gives examples of installations built on these lines.

See also STEAM, Power and Process Work, Use for; WASTE HEAT, Utilization.

EXPLOSIONS

Acetylene. See ACETYLENE, Accident Prevention in Use of.

Anthracite Stoves. Report on Explosions in Anthracite Stoves, S. R. Illingworth, C. A. Seyler and R. V. Wheeler. Fuel, vol. 3, no. 5, May 1924, pp. 170-173, 6 figs. Results of experiments made to determine possibility of explosive gaseous mixtures being formed within anthracite stoves under abnormal conditions of operation.

Report on Explosions in Anthracite Stoves, S. R. Illingworth, C. A. Seyler and R. V. Wheeler. Fuel, vol. 3, no. 3, Mar. 1924, pp. 83-92. Result of investigations carried out for S. Wales & Monmouthshire Coal Owners' Assn.; includes list of explosions investigated up to Mar. 1923.

Bleaching Powder. See BLEACHING POWDER, Explosions.

Chemical Plant, Oppau, Germany. Conclusion of the Investigation of the Oppauer Disaster (Der Abschluss der Untersuchung des Oppauer Unglücks), H. Kast. Chemiker-Zeitung, vol. 48, nos. 32 and 35, Mar. 13 and 20, 1924, pp. 133-135 and 158-160. See English abstract in Chem. & Met. Eng., vol. 30, no. 17, Apr. 28, 1924, p. 666, and editorial comment in Engineering, vol. 117, no. 3042, Apr. 18, 1924, pp. 501-502. Final conclusions based on results of investigation of special committee appointed by German Parliament to determine cause of explosion at plant of the Badische Anilin & Soda Fabrik at Oppau in 1921.

Coal-Dust. See COAL DUST, Explosions.

Coal Mines. See COAL MINES, Explosions.

Dust. See DUST, Explosions.

Grain Elevators. See GRAIN ELEVATORS, Explosions.

Hazard in Industry. The Explosion Hazard in Industry, R. Furness. Chem. Age (Lond.), vol. 11, no. 271, Aug. 23, 1924, pp. 184-186. Reviews problem of preventing explosions in industry, not only when dealing with inflammable materials, but when substances normally regarded as being safe are being handled in finely divided state which may render them liable to "dust" explosions.

Lignone Dust. A Lignone Dust Explosion, P. W. Edwards. Paper Trade Jl., vol. 78, no. 3, Jan. 17, 1924, pp. 47-49, 3 figs. Account of explosion which occurred recently in a large Eastern paper mill in manufacture of lignone, a product from waste sulphite coking liquor, and its probable cause.

Mine. See MINES, Explosions.

Nitrogen-Fixation Plant. Explosion in a Nitrogen-Fixation Installation at Bodio (Ueber die Explosion in Bodio), E. Berl. Zeit. für angewandte Chemie, vol. 37, no. 12, Mar. 20, 1924, pp. 164-165. Experimental evidence does not support Schaarschmidt's conclusion (given in previous issue of same journal, 1923, pp. 533 and 565) that unsaturated constituents of benzine used caused explosion.

Starch Dust. Starch Dust Explosions, G. E. Chamberlain. Chem. Age (N. Y.), vol. 32, no. 2, Feb. 1924, pp. 95-97. Reduction of the hazard; method of conveying starch; storage of starch; decreasing amount of dust produced is best accomplished by humidity; static electricity; isolated buildings for certain operations.

Starch Dust Explosion at Pekin, Illinois, D. J. Price, H. R. Brown and P. W. Edwards. Chem. & Met. Eng., vol. 30, no. 15, Apr. 14, 1924, pp. 579-584, 10 figs. See also Nat. Fire Protection Assn. Quarterly, vol. 17, no. 4, Apr. 1924, pp. 354-359, 4 figs., and Sugar, vol. 26, no. 5, May 1924, pp. 234-237. Official report on explosion at plant of Corn Products Refining Co., by experts of Bur. of Chem. points way of further measures of precaution where dust hazards exist.

The Starch Dust Explosion at Pekin, Illinois, D. J. Price. West. Soc. of Engrs.—Jl., vol. 29, no. 8, Aug. 1924, pp. 305-320, 4 figs. Analysis of facts in connection with explosion at starch factory with loss of 42 lives; indicates precautions to be taken to prevent or minimize damage.

Sugar Dust. Dust Explosions (Die Staubexplosionen), B. Block. Zeit. des Vereins der Deutschen Zucker-Industrie, no. 810, Jan.-Feb. 1924, pp. 37-64. Discusses subject under following captions: occurrence of most explosions directly after resumption of operation; mechanical-thermal causes; hot running of a bearing; friction of machinery parts as cause of explosion; influence of preheating; effect of foreign bodies and sparks; static electricity as cause of explosion; effect of ozone; possible danger of air-delivery installations; warding off of oxygen by use of inert gases; dust removal; etc.

Wave Propagation. The Propagation of Explosion Waves (Sur la propagation des ondes explosives), Th. Vautier. Académie des Sciences —Comptes Rendus, vol. 179, no. 4, July 28, 1924, pp. 256-259, 1 fig. Formation of waves produced in long pipe (1600 m.) of large diam. (1 m.) by explosion of gunpowder and of mercury fulminate is registered and measured by interference method; mercury fulminate produces very short wave, whereas gunpowder produces long wave and shows no discontinuity.

EXPLOSIVES

Acid Economy in Manufacture of. Acid Economy in the Explosives Industry (Säurewirtschaft in der Sprengstoff-Industrie), W. Busching. Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 19, no. 6, June 1924, pp. 81-83, 3 figs. Problem of treating enormous quantities of waste acids produced in German explosives factories during war was solved chiefly by application of processes devised by Pauling, which are described.

Ammonium Nitrate. See AMMONIUM NITRATE.

Ammonium Perchlorate. Ammonium Perchlorate (Ueber Ammonperchlorat), Ph. Naoum and R. Aufschläger. Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 19, no. 8, Aug. 1924, pp. 121-123. Temperatures of explosion are 1084 and 1308 deg.; salt decomposes slowly and quietly and cannot be detonated by heat alone; ammonium chlorate is not nearly so stable, for it may be exploded with even the feeblest detonator, developing temperature of 1700 deg.

Consumption. Explosives Used in December, 1923, W. W. Adams. U. S. Bur. Mines—Reports of Investigations, no. 2573, Feb. 1924, 4 pp.

Statistics on explosives sold during Dec. 1923 for use in United States.

Deflagration. Velocity of Deflagration (Sur le célérité des déflagrations), M. E. Jouguet, Académie des Sciences—Comptes rendus des séances, vol. 179, no. 9, Sept. 1, 1924, pp. 454-457. Discusses equations based on assumption that velocity of deflagration is proportional to absolute temperature, above temperature of flammability.

Detonation. An Electrical Method of Determining the Velocity of Detonation of Explosives, J. E. P. Wagstaff. Roy. Soc.—Proc., vol. 105, no. A731, Mar. 1, 1924, pp. 282-298, 9 figs. Develops method, depending on rate of discharge of condenser, for measurement of time intervals of order of 10^{-4} sec.; method is tested by finding time of impact of steel balls; method is applied to measurements of rates of detonation of high explosives; spurious electrical effects occurring in circut passing through explosive and methods of elimination.

Concerning the Nature of Detonation, F. Olsen. Army Ordnance, vol. 5, no. 26, Sept.-Oct. 1924, pp. 515-517 and 544, 3 figs. Endeavors to explain detonation on basis of electronic configuration of atoms, to measure relative sensitiveness of explosives to detonation on this basis, and to measure velocity of electrons produced by detonations.

Experimental Investigation on Detonation Limit of Gaseous Mixtures (Experimentelle Untersuchungen zur Detonationsgrenze gasförmiger Gemische), R. Wendlandt. Zeit. für Physikalische Chemie, vol. 109, June 25, 1924, pp. 637-655, 4 figs. Examines hydrogen and carbon monoxide mixed with air, monoxide mixed with oxygen.

Velocity of Detonation of Various Types of Explosives, W. H. Ward. Du Pont Explosives Service Bul., no. 7, Feb. 1924, 2 pp. Effect of confinement upon velocity as affecting choice and loading of explosives.

Detonation Transmission to a Distance. The Transmission of Detonation at a Distance, E. Audibert. Quarry & Surveyors' & Contractors' Jl., vol. 29, no. 324, Feb. 1924, pp. 41-43. See also Colliery Guardian, vol. 127, no. 3290, Jan. 18, 1924, p. 153, 2 figs. Factors influencing transmission of detonation; tests carried out to make sure that method adopted at Montluçon Experimental Station for determining aptitude of an explosive for transmitting detonation to a distance is accurate. From Annales des Mines.

Development and Use. Development and Use of Industrial Explosives, A. La Motte. Min. & Metallurgy, vol. 5, no. 213, Sept. 1924, pp. 428-432. Discusses history and characteristics of dynamite, development of new types, strength of expdosives, velocity of detonation, improvements in safety and efficiency, methods of using, etc.

Dynamite. Proofs That Dynamite Acts Equally in All Directions, J. E. Crawshaw. Eng. & Contracting (Railways), vol. 61, no. 2, Feb. 20, 1924, pp. 417-419, 3 figs. Shows error of belief that dynamite acts principally downward.

Explosibility. Explosibility, A Marshall. Chem. & Industry, vol. 43, no. 24, June 13, 1924, pp. 616-618. Discusses causes for differences in behavior of explosives.

German. German High Explosives in the World War, G. C. Hale. Army Ordnance, vol. 5, no. 26, Sept.-Oct. 1924, pp. 523-525, 1 fig. Brief discussion of principal high explosives and substitutes used by Germans, indicating complexity of their problem with regard to high explosives.

H.M.T.D. H.M.T.D.—A New Detonating Explosive, C. A. Taylor and W. H. Rinkenbach. Army Ordnance, vol. 5, no. 25, July-Aug. 1924, pp. 463-466. Preparation and properties of hexamethylenetriperoxidediamine (H.M.T.D.).

Handling. See CABLEWAYS, Explosives Handling.

Liquid Gases. Blasting with Liquid Gases (Sprengen mit verflüssigten Gasen). Zeit. für das gesamte Schiess- u. Sprengstoffwesen, vol. 18, no. 11-12, Nov.-Dec. 1923, pp. 109-115. Compilation of German State patents.

Liquid Oxygen. Liquid Oxygen as a Substitute for Dynamite, F. W. O'Neil. Contract Rec., vol. 38, no. 40, Oct. 1, 1924, pp. 968-972, 10 figs. At large-scale demonstration of use of this explosive, cost per ton of rock broken was 1.28 cents against estimated cost of 3 cents with dynamite.

Liquid-Oxygen Explosives Tried Out in Rock Quarry, F. W. O'Neil. Rock Products, vol. 27, no. 14, July 12, 1924, pp. 30-33, 8 figs. Account of demonstration of power of new explosive given during a blast at Myerstown, Lebanon County, Pennsylvania, on property of Calcite Quarry Co., conducted in accordance with usual procedure followed by company.

Properties of Liquid-oxygen Explosives, G. St. J. Perrott. Am. Inst. Min. & Met. Engrs.—Trans., no. 1388-A, Dec. 1924, 27 pp., 14 figs. Study of certain fundamental characteristics; factors affecting life of cartridge and relation between explosive strength and oxygen content; experimental determination of explosive properties of L.O.X. cartridges packed with variety of lampblacks, gas blacks, and other materials by means of ballistic pendulum, Bichel gage, and measurement of rate of detonation.

Mine. Explosives in Mining, W. Cullen. Colliery Guardian, vol. 128, no. 3338, Dec. 19, 1924, pp. 1567-1568. Discusses uses of explosives in mines; notes on manufacture, testing, gases from explosives, and energy produced by explosives. Abstract of paper read before Manchester Geol. & Min. Soc.

The Evolution of Ammonium-Nitrate Explosives: Their Use and Abuse in Practice, J. Smith. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 158-164. Résumé of evolution of present-day explosives from original one produced by Carl Lamb.

See also MINES, Permissible Equipment and Supplies.

Mine, Extinction of Flame from. The Extinction of Flame from Mining Explosives, W. G. Hiscock. Iron & Coal Trades Rev., vol. 108, no. 2916, Jan. 18, 1924, pp. 90-94 (includes discussion), 39 figs. See discussion in nos. 2925 and 2926, Mar. 21 and 28, 1924, pp. 467-408 and 516-517. Historical survey of previous work; Nobel Research Dept. investigations. Bibliography.

Nitroglycerin. See NITROGLYCERIN.

Nitroglycerin Substitutes. Substitutes for Nitroglycerine in Explosives Manufacture, Chas. L. Reese. Chem. Age (N. Y.), vol. 32, no. 12, Dec. 1924, pp. 481-483. Notes on ammonium nitrate—sugar; nitrostarch; trinitrotoluene; trinitrozylene; nitroglycerine; synthesis of glycerine; miscellaneous nitro bodies.

Permissibles in Coal Mines. Progress in the Use of Permissibles, S. C. Jones. Coal Industry, vol. 7, no. 2, Feb. 1924, pp. 92-94, 2 figs. Future progress, it is claimed, depends largely on selecting proper explosive and knowing how to use it efficiently.

Progress in. Twenty-Five Years' Progress in Explosives, Chas. L. Reese. Franklin Inst.—Jl., vol. 198, no. 6, Dec. 1924, pp. 745-768, 4 figs. Deals particularly with developments in America; progress in black powder; dynamite; nitroglycerine; separation of nitroglycerine; low-freezing

and non-freezing explosives; permissible explosives; substitutes for nitroglycerines.

Research and Manufacture. Exhibits Showing Progress in Explosives, Research and Manufacture, 1900-1924. Chem. News, vol. 128, no. 3344, May 16, 1924, pp. 309-314. Descriptions of exhibits.

Selection and Use. Commercial Explosives—Their Selection and Use, Douglas P. Allison. Eng. & Min. Jl.-Press, vol. 117, no. 5, Feb. 2, 1924, pp. 197-201, 5 figs. Conditions which have been responsible for manufacture of the different kinds of dynamite, and which govern its uses; discussion of the various kinds of explosives.

Specific Heats. The Specific Heats of Trinitrotoluene, Tetryl, Picric Acid and Their Molecular Complexes, C. A. Taylor and W. H. Rinkenbach. Am. Chem. Soc.—Jl., vol. 46, no. 6, June 1924, pp. 1504-1510. Specific heats of tetryl, picric acid, trinitrotoluene, tetryl:picric acid, tetryl:trinitrotoluene, have been measured over a range of temperature from 0 deg. to 60 deg. to 125 deg. Values obtained indicate that Kopp's law does not hold for trinitrotoluene, tetryl or picric acid.

Thermits and. Explosives and Thermits, A. Marshall. Chem. & Industry, vol. 43, no. 13, Mar. 28, 1924, p. 326. Thermit is defined as substance or mixture capable of undergoing endothermal reaction with sufficient velocity to prevent reaction dying out, without giving off sufficient gaseous products to scatter material; if velocity of reaction be of same order as that of explosive and material be not specially pure, it will in most cases behave as explosive and not as thermit.

T.N.T., Purification of. The Purification of TNT, H, Muraour. Army Ordnance, vol. 5, no. 26, Sept.-Oct. 1924, pp. 507-511. Describes process of American origin utilized in France, consisting in treatment of trinitrotoluene, in the cold, with a dilute solution of sodium sulphite. Results obtained in treatment of industrial TNT; analytical utilization of sulphite reaction; causes of errors in application of method. Translated from Bul. de la Société Chimique de France, Mar. 1924, pp. 367-379.

EXPORT TRADE

Machine Tools. See MACHINE-TOOL INDUSTRY, Export Problem, U. S.

EXTRUSION OF METALS

Brass Rods. The Extrusion of Brass Rod By the Inverted Process, R. Genders. Inst. of Metals—Advance Paper no. 6, for meeting Sept. 8-11, 1924, 11 pp., 6 figs. partly on supp. plate. Method of overcoming formation of coring defect favored by author consists in completely altering direction of flow in receiver by inverting process, so that die is pressed into billet, rod being extruded through a hollow plunger. Describes experiments carried out on a manufacturing scale with a press designed to extrude by new method.

The Extrusion and Drawing of Brass Rod, J. Williams. Am. Mach., vol. 66, no. 14, Apr. 3, 1924, pp. 497-498, 3 figs. Process of cold-drawing of brass rods as practiced by Bridgeport Brass Co., in production of commercial rods.

EYES

Injuries to. See ACCIDENTS, Eye Injuries.

Lighting, Effect on. See LIGHTING, Eye, Effect on.

EYESIGHT

Conservation. See HEALTH, Eyesight Conservation.

F

FABRICS

Aircraft. See AIRCRAFT CONSTRUCTION MATERIALS, Dopes; Fabrics.

Patents. Fabrics, Treating Otherwise Than by Finishing and Dressing. Abridgments of Specifications (Lond.), Class 42 (II). Abridgment of British Patents between 1916-1920, no. 100,001-155,800, class 42 (II) covering fabrics, felt and felt substitutes, flock, measuring continuous lengths of materials, rollers or cylinders.

Wear-Testing Machine. A Machine for Investigating the Resistance of Fabrics to Abrasion ("Wear"), Rob. P. Ethridge. Testing, vol. 1, no. 2, Feb. 1924, pp. 156-159, 2 figs. Principle of design of cloth wear-testing machine.

FACTORIES

[See also INDUSTRIAL PLANTS.]

Automobile. See AUTOMOBILE MANUFACTURING PLANTS.

Building Improvements. The New Competition and Your Building, Geo. C. Nimmons and W. E. Ballinger. Indus. Mgmt. (N. Y.), vol. 77, nos. 1, 2, 3, 4, 5, and 6, Jan., Feb., Mar., Apr., May, and June, 1924, pp. 3-7, 4 figs.; 91-97, 7 figs.; 140-144, 5 figs.; 250-254, 4 figs.; 297-302, 7 figs.; and 356-362, 9 figs. Jan.: Part played by building in increasing volume and lowering cost of production. Feb.: Planning structure. Mar.: Economic aspects of building operations. Apr.: Daylight and modern building construction. May: Roofs for industrial buildings. June: Increasing use of concrete in factory construction, by H. C. Campbell.

Conveyors. See CONVEYORS, Factory.

Design and Maintenance. Design and Maintenance of Factory Buildings, H. Pearman. Indus. Mgmt. (Lond.), vol. 11, nos. 2, 4, 6, 8, 10, and 13, Jan. 24, Feb. 21, Mar. 20, Apr. 17, May 15, and July, pp. 38-40, 95-97, 153-154, 211-212, 267-268, and 349-350, 2 figs. Jan. 24: Transport and general service facilities in relation to a works, and selection and installation of plant. Feb. 21: System of grouping manufacturing sections. Mar. 20: Problems relating to losses due to faulty economy in internal layout of factory. Apr. 17: Economy in road construction. May 15: Schedule of buildings. July: Choice and location of factory site.

Equipment Maintenance. Maintenance of Plant Equipment, W. L. Hitt. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 43-45, 1 fig. Maintenance of plant equipment at East Pittsburgh plant of Westinghouse Elec. & Mfg. Co. Describes organization of maintenance department, doors and windows, cleaning electric-light globes and reflectors, upkeep of fire equipment, and care of belting.

Floors. See FLOORS, Factory.

Heating. See HEATING, ELECTRIC, Industrial Buildings.

Heating and Ventilating. See HEATING AND VENTILATION, Factories.

Inspection. Factory Inspection in Greece in 1921. Int. Labour Rev., vol. 10, no. 1, July 1924, pp. 136-155. Details of factory inspection in Greece, Czechoslovakia, Belgium, India, and Switzerland.

Some Problems of Factory Inspection. Int. Labour Rev., vol. 9, no. 3, Mar. 1924, pp. 372-386. Brief account of main lines of development of factory inspection, both in theory and practice, taking as basis reports prepared by Int. Labor Office.

Lighting. See LIGHTING, Factories.

Location of. How Would You Pick a Factory Location? M. G. Farrell. Factory, vol. 33, no. 3, Sept. 1924, pp. 336-338, 438 and 440-445, 1 fig. Discusses importance of studying thoroughly the various districts when searching for a manufacturing location, when it is profitable to locate in a segregated district, why it is necessary to study labor conditions in district surrounding proposed location, etc.

Management. See INDUSTRIAL MANAGEMENT.

Materials Handling in. See MATERIALS HANDLING, Factories.

Power and Heating Plant. Investigation of Advisability of Installing, in a Large or Medium-Sized Factory, Its Own Power and Heating Plant (Untersuchungen betr. Errichtung einer eigenen Stromerzeugungs- und Heizungs-Anlage für einen grösseren Fabrikbetrieb), R. Stetefeld. Wärme- u. Kälte-Technik, vol. 26, no. 18, Sept. 15, 1924, pp. 156-159. Detailed figures and calculations showing that with own power and current central a saving of over $26,000 per year results in a given factory.

Produced Gas for Power and Heating. See PRODUCER GAS, Factory Power and Heating.

Storeroom Shelves and Racks. Modern Practice in the Use of Shelves and Racks in Industrial Storerooms, F. E. Gooding. Indus. Engr., vol. 82, no. 12, Dec. 1924, pp. 571-573 and 602-603, 17 figs. For storing miscellaneous repair and maintenance parts and supplies as well as material both before and after manufacture and between operations during work in process.

FACTORY MANAGEMENT. See INDUSTRIAL MANAGEMENT.

FANS

Centrifugal. Application and Operation of Centrifugal Fans, R. E. Cramer. Combustion, vol. 11, no. 3, Sept. 1924, pp. 199-201, 3 figs. Analysis of conditions surrounding application and operation of centrifugal fans in boiler plants from viewpoint of influence of fan and its method of control upon capacity and overall economy of plant.

Centrifugal Fans and Their Characteristics, R. T. Livingston. Power Plant Eng., vol. 28, nos. 21, 22, and 24, Nov. 1, 15, and Dec. 15, 1924, pp. 1105-1106, 1159-1161, and 1262-1263, 11 figs. Nov. 1: Principles of centrifugal fans, types and service requirements. Nov. 15: Study of characteristics of fans and their adaptability for various services. Dec. 15: Application of fan principles toward selection of fans for various purposes.

Experiments on the Distribution of Air in Centrifugal Fans and on Re-Entry Phenomena, H. Briggs and J. N. Williamson. Instn. Min. Engr.—Trans., vol. 67, part 1, Mar. 1924, pp. 84-94 and (discussion) 94-99, 21 figs. Also Colliery Guardian, vol. 127, no. 3295, Feb. 22, 1924, pp. 465-466, 21 figs. Experiments made at Heriot-Watt College, Edinburgh, and at Wellesley Colliery, Fife, bearing upon manner in which centrifugal fan of drum type deals with air it discharges; shows how uneven is distribution of air passing through wheel, and directs attention to the different forms of re-entry of air.

See also Selection and Operation.

"Cindervane." See BOILER PLANTS, Flue-Dust Separator.

Design and Application. Some Common Faults in Fan Design and Application, F. G. Whipp. Domestic Eng. (Lond.), vol. 43, no. 12, Dec. 1923, and vol. 44, no. 1, Jan. 1924, pp. 253-259 and 17-19, 6 figs. Discusses speed of a fan, bearings, and methods of arranging fan drives.

Electrically Driven. How to Choose Motors for Driving Industrial Fans, R. H. Rogers. Chem. & Met. Eng., vol. 30, no. 6, Feb. 11, 1924, pp. 231-233, 9 figs. Notes on utility of various types of motors and control devices that are available for fan service.

Motor Drives for Mine Fans, F. W. Cramer. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 8-11, 4 figs. Comparison of various types of motors which may be used to drive mine fans from standpoint of efficiency, speed control, initial cost, and power factor.

Selecting the Best Type of Motor for Driving a Mine Fan at Variable Speed, B. W. Chadbourne. Coal Age, vol. 25, no. 20, May 15, 1924, pp. 722-725, 7 figs. Large first cost justified when energy charge is high; motor should operate at high efficiency and slow speed; results of tests to compare various systems.

The Argument for the Slow-Speed Direct-Connected D.C. Motor for Ventilating Fan Drive, J. L. McK. Yardley. Heat. & Vent. Mag., vol. 21, no. 4, Apr. 1924, pp. 43-46, 10 figs. How motor ratings have increased; limit reached in reductions of speed of a.c. motors; transforming a.c. to d.c.

Exhaust. Things to Know About Fan Application, H. W. Pfeffer. Sheet Metal Worker, vol. 15, no. 8, May 9, 1924, pp. 283-285 and 309, 3 figs. Important truths essential to a complete understanding of how to lay out a successful exhaust system; capacities to figure on; air velocities needed; pipe sizes; general suggestions.

Installation. Auxiliary Equipment for Blast and Ventilating Fans, D. L. Hubbard. Mech. Wld., vol. 76, no. 1961, Aug. 1, 1924, pp. 70-72, 6 figs. Discusses proper foundations and supports, absorption of vibrations, preferably by means of cork slab; fan and motor noises; fan drives by steam engine and turbine; push-button control.

Mine. Explanation of Fan in Electrical Terms; Increasing Efficiency with New Drive, J. F. MacWilliams. Coal Age, vol. 25, no. 2, Jan. 10, 1924, pp. 53-54, 1 fig. Account of tests made on number of fans scattered throughout coal region.

Mine Fans and Mine Ventilation, W. J. Montgomery. Modern Min., vol. 1, no. 5, Dec. 1924, pp. 135-141, 9 figs. Advantages and disadvantages of exhaust and blowing fans; size of fan; size of air ways; ventilating formulas for mine fans.

Principles of the Design of Mine Fans. Colliery Engr., vol. 1, nos. 4 and 5, June and July 1924, pp. 163-166 and 231-233, 11 figs. Study of fans suited to British colliery conditions. Principal features and functions of exhaustive ventilator, the typical kind of ventilator employed in British mines.

Some Features of Ventilating Fans at 164 Coal and Metal Mines, D. Harrington and M. W. von Bernewitz. U. S. Bur. Mines—Reports of Investigations, no. 2637, Sept. 1924, 5 pp. Discusses various features of fan installations at mines where disasters have been studied, and handling of air currents at time of and after disasters, and includes also loss of life and number of men injured.

The Change of Air Supply in Mine Fans, A Latsinsky. Russian Min. Jl., vol. 100, no. 1, Jan. 1924, pp. 31-34. (In Russian.)

See also Centrifugal.

Selection and Operation. Selection and Operation of Centrifugal Fans, Chas. L. Hubbard. Power Plant Eng., vol. 28, no. 4, Feb. 15, 1924, pp.

242-244, 2 figs. Proportioning fan to its load is vital factor in securing economy; principles of fan operation; resistances and outlet velocities.

Support and Drive. Auxiliary Equipment for Blast and Ventilating Fans, Chas. L. Hubbard. Power, vol. 59, no. 9, Feb. 26, 1924, pp. 318-321, 6 figs. Methods of supporting fan and drive to meet various conditions; preventing vibration; air velocities; engine and turbine drives; d.c. and a.c. motor drives; speed regulation with motor drive.

Testing. Testing of Mine Fans, D. W. Rees. Colliery Eng., vol. 1, no. 8, Oct. 1924, pp. 393-394. States that considerable reform of present methods is desirable, and discusses points requiring attention.

Ventilators and Exhausters. Ventilators and Exhausters (Ventilatoren und Exhaustoren), H. R. Karg. Praktischer Maschinen-Konstrukteur, vol. 56, nos. 46-47 and 50-51, Nov. 27 and Dec. 24, 1923, and vol. 57, nos. 1-2 and 5, Jan. 8, and Feb. 5, 1924, 13 pp., 8 figs. Nov. 27: Critical discussion and recommendations. Dec. 24: Openings and admission velocities. Jan. 8: Determination of inside and outside blade angles. Feb. 5: Determination of speed of admission of gases in vane wheel.

FARM MACHINERY

Agricultural Show, England. The Royal Agricultural Society's Show, Leicester. Engineer, vol. 138, nos. 3575, 3576, and 3577, July 4, 11, and 18, 1924, pp. 11-12, 50-52, and 80-82, 19 figs. See also Engineering, vol. 118, nos. 3053 and 3054, July 4 and 11, 1924, pp. 20-23 and 59-61, 12 figs. Description of exhibits, including gas engines, oil engines, electric lighting sets, tillers, tractors, road rollers, thrashing machines, Blackstone cold-starting crude oil engine, front-action side-delivery combined rake and swather, grinding mill for cement concrete, fire pumps, etc.

The Smithfield Club Show. Engineer, vol. 138, no. 3598, Dec. 12, 1924, pp. 666-667, 4 figs. Details of more interesting exhibits at Agricultural Hall, Islington, including Sentinel portable engine, 3-way tipping steam wagon, 7½-ton steam tractor, thrashing machines, etc.

Electricity Applications. Electricity at the Paris Agricultural Machinery Show, R. B. Matthews. Elec. Rev., vol. 94, no. 2414, Feb. 29, 1924, pp. 326-327, 7 figs. Review of exhibits at show, indicating considerable attention paid to electric driving of farming machinery.

See also ELECTRICITY, APPLICATIONS OF, Agriculture.

Gas and Oil Engines. The Royal Agricultural Show. Gas & Oil Power, vol. 19, no. 226, July 3, 1924, pp. 187-189, 5 figs. Describes some of exhibits of gas and oil engines.

German Show. Agricultural Machines at the Exhibition in Hamburg (Landwirtschaftliche Maschinen auf der Wanderausstellung in Hamburg), G. Fischer. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 52, Dec. 27, 1924, pp. 1329-1335, 15 figs. Tendencies toward standardization; improvements in various types of tilling, sowing, harvesting, and threshing machines, steam plows and road engines.

Mechanical Grain Sowing. The Problem of Mechanical Sowing of Grain (Das Problem der maschinellen Einzelkornsaat), Geo. Kühne. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 6, Feb. 9, 1924, pp. 113-118, 19 figs. Deals with different methods and machinery in Germany for sowing of single seeds of grain.

Motor Plows. See MOTOR PLOWS.

Patents. Cultivating Implements and Systems. Abridgments of Specifications (Lond.), Class 6 (i), 1924, Period 1916-20, 196 pp. Patents for inventions, including agricultural implements and machines for working soil, manure distributors, seed sowers, planting machines, machines for depositing powdered and other discrete materials on or in land, on crops or roads and ways, and in mines, rollers, etc.

Plows. See PLOWS.

Rollers. A Roller for Use on Peat Land, J. T. Stewart. Am. Peat Soc.-Jl., vol. 17, no. 2, Apr. 1924, pp. 57-69, 9 figs. Discusses design and construction of heavy roller consisting of metallic shell and filled with concrete for passing over surface of peat soils to increase crop yields.

Threshing Machines. Economies of Electric Threshing Operations (Die Wirtschaftlichkeit des elektrischen Dreschbetriebes), H. Holm. Elektrische Betrieb, vol. 22, no. 16, Aug. 24, 1924, pp. 157-159. Details of cost of equipment and available current; comparison with oil and steam operations show marked advantage of electricity.

FATHOMETER See SOUND RANGING, Submarine Ship Detectors.

FATIGUE

Industrial. Fatigue a Vital Consideration of Forge Shop Management, Jos. Thompson. Forging—Stamping—Heat Treating, vol. 10, no. 11, Nov. 1924, pp. 409-412. Consideration of well being of employes furnishes basis for coöperation; lack of sympathetic understanding cause of industrial unrest.

Metals. See METALS, Fatigue of; STEEL, Fatigue Tests.

FATS

Colloid Chemistry of. See OILS, Colloid Chemistry of.

Petroleum as Source. See OIL, Fats, Production from.

FEEDWATER HEATERS

Design. Feedwater Heaters in Evaporation Plants (Du timbre et de l'emplacement des réchauffeurs d'eau dans les groupes évaporatoires), M. Emanaud. Revue Industrielle, vol. 54, no. 3184, Nov. 1924, pp. 366-370, 3 figs. Compares old and new methods of boiler construction and operation; modern evaporating systems; quantity of heat absorbed, heat transmission, etc.

Locomotive. Analysis of Feed Water Heating Devices, E. P. Gangewere. Ry. Mech. Engr., vol. 98, no. 7, July 1924, p. 409. Feedwater heaters with pumps take more heat from exhaust than exhaust-steam injector type.

Feed-Water Heaters Difficult to Machine. Iron Age, vol. 114, no. 25, Dec. 18, 1924, pp. 1605-1607, 5 figs. Cost-saving practices of Worthington Pump & Machy. Corpn. in manufacture of locomotive feedwater heaters and pumps.

Locomotive Feed Water Heating, J. M. Lammedee. St. Louis Ry. Club—Official Proc., vol. 29, no. 6, Oct. 10, 1924, pp. 87-110, 8 figs.; and (abstract) in Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, pp. 361-364; also Ry. Rev., vol. 75, no. 22, Nov. 29, 1924, pp. 869-873, 8 figs. Review of developments; general principles underlying feed-heating process and prevailing methods of putting these principles into practice, both in America and abroad.

FELDSPAR

Mining. Feldspar's Many Uses, A. S. Taylor. Cement, Mill & Quarry, vol. 25, no. 7, Oct. 5, 1924, pp. 30-34, 15 figs. Mentions in a general way industrial uses of feldspar. Describes activities of Crown Point Spar Co. in mining feldspar which outcrops on crest of Breed mountain, about a mile to south of village of Crown Point,

northern New York, and in preparing it for various market purposes.

Sweden. Future of Swedish Feldspar (Den svenska Fältspatens framtid), E. Bohr. Teknisk Tidskrift, vol. 54, no. 37, Sept. 13, 1924, pp. 341-343 (Allmänna Avdelningen), 3 figs. On account of limited existing quantities of pure Swedish feldspar a policy of conservation of national resources is urged.

United States Production. Feldspar in 1922, F. J. Katz. U. S. Geol. Surv., no. II:27, 1924, pp. 251-259, 1 fig. Production statistics, and prices.

Uses. Feldspar a Mineral Having Many Uses, A. S. Taylor. Compressed Air Mag., vol. 29, no. 9, Sept. 1924, pp. 985-988, 14 figs. Describes activities of Crown Point Star Co. in mining feldspar; mineral has been used in manufacture of glass, white pottery and enameled metal wares, also scouring soaps, fertilizers, etc.

FERRIES

Electric Propulsion. Ferry Transportation. Jl. Pacific Ry. Club—Proc., vol. 8, no. 4, July 1924. Contains following papers: Electric Ship Propulsion, by M. Rhine, pp. 5, 7, 9, 11 and (discussion) 11, 13, 15, 17 and 19, discussing development of electric drive for ship propulsion in America, dealing also with ferries; Ferry Steamer Operation, by C. F. Heath, pp. 19-26, describing how ferry system of Southern Pacific Co. is handled and operated; and remarks by D. W. Dickie, pp. 26-27.

Oil-Engine-Driven. An Oil-Engine Driven Ferryboat, Wm. H. Hoffman. Power, vol. 59, no. 2, Jan. 8, 1924, pp. 53-54, 2 figs. Details of only direct-connected, oil-engine-driven, double-ended ferryboat in United States or abroad; operated on Hudson River.

Oil-Engine-Driven Ferryboat of Exceptional Merits, R. G. Skerrett. Compressed Air Mag., vol. 29, no. 1, Jan. 1924, pp. 739-743, 19 figs. General characteristics of Hudson-Athens; overall length, 115 ft.; maximum beam over guards, 44 ft.; loaded draft, 7½ ft.; details of engine.

Train. Cradles for a Train Ferry Service Service in Nigeria. Engineer, vol. 138, no. 3581, Aug. 15, 1924, pp. 182-184, 6 figs. partly on p. 186. Particulars of installation at Benue River, which consists generally of two inclined slipways connected with railway, one on each bank, up and down which rolling stock is shunted; two traveling cradles, one for each slipway, to receive wagons from slipways and to enable them to be transferred to and from decks of ferry steamers; a timber guide pier along down-stream side of each slipway; and two ferry steamers.

Mississippi Car-Transfer Steamer for Gulf Coast Lines. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1064-1065, 2 figs. Particulars of new side-wheel car-transfer or car-ferry steamer; three tracks provide capacity for 11 passenger cars or 23 freight cars; two geared engines operate paddle wheels independently; deadweight about 1500 tons, and maximum speed about 12 m.p.h. with full load and in still water; length overall, 346 ft.; width over deck, 91½ ft.; depth of hull, 11 ft.; loaded draft, 6 ft.

The Harwich-Zeebrugge Train-Ferry. Ry. Gaz., vol. 40, no. 14, Apr. 4, 1924, pp. 507-509, 2 figs. Particulars of service that will enable traffic to pass without transhipment between continental countries and Great Britain. Describes plant and equipment at Harwich and Zeebrugge.

The Japanese Train-Ferry Turbine Steamer "Shoho-Maru." Engineering, vol. 118, no. 3074, Nov. 28, 1924, p. 735, 10 figs. on supp. plate. Constructed by Uraga Dock Co., Japan, for cross-channel service.

Twin-Screw Train Ferries for Lake Michigan. Shipbldg. & Shipg. Rec., vol. 24, no. 19, Nov. 6, 1924, pp. 540-543, 7 figs. Notes on Pere Marquette 21 and Pere Marquette 22, built and engined by Manitowoc Shipbldg. Corpn. for Pere Marquette Ry. Co.; length overall, 360 ft.; breadth molded, 56 ft.; depth to main deck, molded, 21 ft. 6 in.

FERROALLOYS

Analysis. Analysis of Grey Iron Foundry Alloys. Foundry Trade Jl., vol. 30, nos. 430 and 431, Nov. 13 and 20, 1924, p. 416 and 445-447. Sulphur in ferrosilicon and silico-spiegel; phosphorus; spiegeleisen and ferromanganese; standard permanganate solutions.

Carbon Content. See STEEL, Carbon-Content Determination.

Developments, 1923. Ferroalloy Developments in the Past Year, Rob. J. Anderson. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 94-97. Market conditions and results of metallurgical research; growing field of special alloys.

Ferrochromium. See CHROMIUM, Uses and Alloys.

Ferrophosphorus. See FERROPHOSPHORUS.

Ferrosilicon. See FERROSILICON.

Uses. Ferro-Alloys, Fr. M. Becket. Chem. & Met. Eng., vol. 30, nos. 5, 8 and 10, Feb. 4, 25, and Mar. 10, 1924, pp. 186-188, 316-318, and 391-393. Feb. 4; Story and uses of ferrosilicon; status of industry; metallic silicon. Feb. 25: Developments and utility of ferrochromium. Mar. 10: Ferroalloys of tungsten and vanadium.

FERROCHROMIUM.

See CHROMIUM, Uses and Alloys.

FERROCONCRETE.

See CONCRETE CONSTRUCTION, REINFORCED, Marine Shelters.

FERROCRETE.

See CEMENT, PORTLAND, Rapid-Hardening.

FERROMAGNETISM

Theoretical Study. Ferromagnetism and Its Dependence upon Chemical, Thermal and Mechanical Conditions, L. W. McKeehan. Franklin Inst. —Jl., vol. 197, nos. 5 and 6, May and June 1924, pp. 583-601 and 757-786, 28 figs. Review of experimental work and survey of existing state of knowledge in regard to magnetism; review of magnetic properties of known ferromagnetics, and principal agents which vary these properties. Bibliography.

FERROPHOSPHORUS

Electric-Furnace Production. Production of Ferrophosphorus in the Electric Furnace, Th. Swann. Am. Inst. Min. & Met. Engrs.—Trans., no. 1383-S, Oct. 1924, 3 pp. In ordinary operation of electric furnace in production of ferrophosphorus, alloy may be produced containing 26 per cent phosphorus, which is said to be the limit.

Manufacture. Manufacture of Ferrophosphorus at Rockdale, Tenn. Am. Inst. Min. & Met. Engrs. —Trans., no. 1360-M, Oct. 1924, 5 pp. 1 fig. Points out that process of manufacturing ferrophosphorus lies not alone in smelting mixture of phosphates, silica, iron ore, with coke as fuel, but upon smelting this mixture with coke and air as chemical agents as well as heat producers and in conjunction with extraordinary procedures and manipulations making process continuous and profitable; conditions for best results.

FERROSILICON

Silicon Determination in. Determination of Silicon in Ferrosilicon (Bestimmung der Kiesel-

säure im Ferrosilicium), H. Dubovitz. Zeit. für angewandte Chemie, vol. 37, no. 1, Jan. 3, 1924, p. 13. Ferrosilicon can be dissolved by warming with 40 per cent potassium or sodium hydroxide; by using this method a nickel crucible can be used in place of platinum one required for fusion with sodium hydroxide and magnesia, and repetition of this troublesome process avoided.

FERTILIZERS

Acid Phosphate Production. Fertilizer Industry Conquering Corrosion. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 50-51, 1 fig. Survey of industrial practice in production of acid phosphate, largest constituent of commercial fertilizer.

Activated Sludge. Activated Sludge as a Fertilizer, V. H. Kadish and O. J. Noer. Pub. Wks., vol. 55, no. 10, Oct. 1924, pp. 311-312. Milwaukee sewerage commission plans to produce a fertilizer attractive in form as well as valuable for farms, golf courses and lawns. Condensed from paper before Am. Soc. for Mun. Improvements.

See also SEWAGE DISPOSAL, Activated Sludge.

Calcined Phosphate. The Preparation and Chemical Nature of Calcined Phosphate, E. W. Guernsey and J. Y. Yee. Indus. & Eng. Chem., vol 16, no. 3, Mar. 1924, pp. 228-232, 4 figs. Describes series of experiments with small rotary kiln made to determine optimum conditions for preparation of material; it appears probable that manufacture of calcined phosphate is commercially feasible.

Hair and Leather, Manufacture from. Utilization of Hair and Leather in the Manufacture of Commercial Fertilizers, J. A. Skooglund. Am. Leather Chemists Assn.—Jl., vol. 19, no. 1, Jan. 1924, pp. 11-14. Describes standard process for conversion of two by-products into suitable plant food.

Nitrogenous. Available Nitrogen in Fertilizers, Jas. W. Kellogg. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 371-372. Need of new method for its determination.

Form of Nitrogen Most Favorable for Higher Plants (Sur la forme de l'azote la plus favorable aux plantes supérieures), G. Truffaut and N. Bezssonoff. Académie des Sciences—Comptes Rendus, vol. 178, no. 8, Feb. 18, 1924, pp. 723-725. Investigation of various nitrogenous fertilizers on growth of commoner crops; describes types of mixtures which have enabled percentage of nitrogen in fertilizer to be reduced from 3 to 2 per cent, while yield of crop is at same time increased.

The New Nitrogenous Fertilisers, E. J. Russell. Chem. Trade Jl., vol. 74, no. 1913, Jan. 18, 1924, pp. 64-65. Notes on nitrate of lime, nitrate of ammonia, urea, and ammonium chloride. From Int. Rev. of Sci. & Practice of Agriculture, Oct.-Dec. 1923. See also Am. Fertilizer, vol. 60, no. 3, Feb. 9, 1924, pp. 30-32.

Phosphate Plant. A Modern British Superphosphate Plant. Chem. Age (Lond.), vol. 11, no. 272, Aug. 30, 1924, pp. 212-213, 4 figs. Design and construction of factory equipped with mechanical handling devices.

Phosphatic. Importance for Germany of a Supply of Artificial Fertilizers, Especially Phosphatic Fertilizers (Die Bedeutung der Versorgung Deutschlands mit künstlichen Düngemitteln, insbesondere mit Phosphorsäuredüngern, für die Volksernährung), O. Lemmermann. Zeit. für angewandte Chemie, vol. 37, no. 7, Feb. 14, 1924, pp. 81-84. Author calculates that at least 450,000 tons of phosphoric acid are required; deficiency of phosphoric acid can be made good, however, by addition of silicic acid, preferably in colloidal form, and this applies not only to cereals but to all crops hitherto investigated.

Phosphatic Fertilisers: Some Recent Problems Discussed. Chem. Age (Lond.), vol. 10, no. 241, Jan. 26, 1924, pp. 84-86. Discusses some of the theories which have been put forward to explain phenomena of absorption of phosphates by plants, and influence of other chemicals present in, or added to, soil.

Potash. The Effects and Uses of Potash Fertilisers, G. A. Cowie. Chem. Age (Lond.), vol. 10, no. 241, Jan. 26, 1924, pp. 87-88. Emphasizes pressing need of coördination of both experimental schemes and of research plant, and indicates practical problems awaiting investigation from both points of view.

Pulverizing Ingredients. Pulverizing Fertilizer Ingredients, L. H. Sturtevant. Chem. & Met. Eng., vol. 30, no. 5, Feb. 4, 1924, pp. 193-195, 4 figs. Practical discussion of grinding problems which are encountered by all types of plants in fertilizer industry.

Sewage Sludge as. Fertilizing Value of Activated Sludge. Public Wks., vol. 55, no. 1, Jan. 1924, pp. 23-24. Progress report of investigations made by Sewerage Commission of city of Milwaukee. Economic value as fertilizer greater than that of any other nitrogen-producing material.

Hygienic Aspects of Use of Sewage Sludge as Fertilizer, A. Wolman. Eng. News-Rec., vol. 92, no. 5, Jan. 31, 1924, pp. 198-202. Foreign and American regulations more rigid than most recent and reliable laboratory data which indicate that well-digested sludge will not cause vegetable-borne disease. Special report of State Board of Health of Md.

World Supply. Fertilizers: The World Supply, H. A. Curtis. Am. Fertilizer, vol. 60, no. 6, Mar. 22, 1924, pp. 25-30. Potash, phosphorus, and nitrogen resources; main sources of inorganic nitrogen; growth of air-nitrogen industry; cyanamid process; future of fertilizer industry. Reprinted from Foreign Affairs, Mar. 15, 1924.

FILAMENTS

Metallic, Drawing. See WIRE DRAWING, Filaments.

FILES

Manufacture. Machinery and Methods in Modern File Making, H. P. Armson. Can. Machy., vol. 31, no. 27, July 3, 1924, pp. 19-23 and 44-45, 4 figs. Describes machinery and methods employed in plant of Nicholson File Co., at Port Hope, Ont.; 1200 doz. per day produced; 500 different sizes made. Forging, annealing, cutting, hardening, and tempering all essential features.

FILTER PRESSES

Chamber and Frame Types. Industrial Filtration, S. G. Ure. Chem. & Industry, vol. 43, no. 6, Feb. 8, 1924, pp. 136-141, 9 figs. British chamber and frame presses.

FILTERS

Apparatus for Ultra-Filtration. Apparatus for Ultrafiltration (Neue Ultrafiltergeräte), H. Bechhold and L. Gutlohn. Zeit. für angewandte Chemie, vol. 37, no. 29, July 17, 1924, pp. 494-497, 1 fig. Crucibles, dishes, etc., made of porous earthenware, are coated inside with membrane of collodion or the like, and are placed on rubber ring on filter flask, which is connected to a water pump; porous material is resistant to red heat, at which membrane burns away quietly and without ash; apparatus can be used with advantage in analytical work, for filtering fine precipitates or colloidal solutions.

Installation and Operation Costs. Cost of Filtration Equipment and Operation, W. G. Whitman

and T. Fuwa. Chem. & Met. Eng., vol. 30, no. 9, Mar. 1, 1924, pp. 355-359, 4 figs. Analysis and comparison of factors that determine cost of installation and operation of three principal types of filters.

Sand. See FILTERS, SAND.

Sand for. See SAND, Filter.

Selection. What Is the Most Suitable Filter?, D. R. Sperry. Chem. & Met. Eng., vol. 31, no. 11, Sept. 15, 1924, pp. 422-428, 8 figs. Factors that enter into intelligent selection of a filter. Deals with filters in which solids are separated from liquids, six principal kinds being considered. Includes critical discussion of article.

Sewage-Sprinkler Nozzles. A Method for Comparing Sprinkler Nozzle Performance, M. J. Zucrow. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 999-1001, 4 figs. Application of data obtained by testing circular sewage sprinkler nozzles under constant heads to any conditions of variable-head operation.

Trickling, Dosing Control of. Butterfly Valve Dosing Control for Trickling Filters, H. R. King. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1049-1050, 2 figs. Suggests for trial a method for operating trickling filters so that a good sewage distribution may be maintained, and if possible, filter bed capacities thereby increased. Sliding cam to control valve on outlets to the several filter dosing areas.

FILTERS, SAND

Cleaning. Cleaning Filter Sand, C. H. Capen. Pub. Works, vol. 55, no. 7, July 1924, pp. 216-218, 1 fig. Method employed at Salem, N. J., using causting soda and soda ash for cleaning badly clogged filters, consists of aeration, coagulation, rapid sand filtration, and chlorination.

Method of Cleaning Filter Sand Without Removal, C. H. Carpen. Eng. & Contracting (Water Works), vol. 61, no. 6, June 11, 1924, pp. 1283-1285, 1 fig. How combination of caustic soda and soda ash was employed at Salem, N. J., for washing sand. From Pub. Health News.

Sand-Bed Studies. Sand-Bed Studies at Montebello Water Filters, Baltimore, J. R. Baylis. Eng. News-Rec., vol. 92, nos. 13 and 14, Mar. 27 and Apr. 3, 1924, pp. 516-522 and 563-568, 9 figs. Observation of individual sand grains discloses gelatinous coating, thickness of which affects efficiencies; jet action from perforated pipes near surface controls films. Apr. 3: Discussion of article and reply by author.

Slow. Operation of Slow Sand Water Filters at Hartford, Conn., C. M. Saville. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 508-509, 3 figs. Stored surface water filtered at rates averaging 4.54 m.g.d. in 1923 with maximum of 20 m.g.d. and at average operating cost of $4.61. Color removal 41.7 per cent for 1922 and 1923.

FILTRATION

Process of. Studies on the Process of Filtration (Studien über den Filtrationsvorgang), K. Schaum. Kolloid-Zeit., vol. 34, no. 1, Jan. 1924, pp. 1-12, 4 figs. Points out that retardation of filtration is mainly due to formation of cakes of filtered material and to stopping of pores; retardation may be prevented or reduced by stirring during filtration, or by scraping off cake of material as it is formed, but in this case there must be no closing of pores; filtration after sedimentation, where latter takes place slowly, is very efficient method; filtration by means of immersion filters gave good results in all cases examined.

Suspended Particles from Gases. A Special Case of Filtration (Sur un cas particulier de la filtration), C. Dosios. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1175-1177. Mathematical reasoning is adduced to show that when gas carrying ultramicroscopic particles in suspension is passed through pores of filter, walls of which exercise positive adsorption on suspended particles, selective action takes place, in that particles of certain dimensions will pass, while those which are smaller or larger will be retained.

FILTRATION PLANTS

Buffalo, N. Y. Buffalo's New Filtration Plant, G. C. Andrews. Pub. Wks., vol. 55, nos. 9 and 10, Sept. and Oct. 1924, pp. 271-274 and 304-308, 9 figs. Largest rapid-sand-filter plant in world; built on land reclaimed from lake; foundations 20 ft. below lake level; features of plans; designing and construction of concrete structures; excavation and materials of construction handled by cableways spanning entire work; connections to intake and other tunnels.

Conical-Bottom Steel Tanks. Remodeled Plant Solves Mud Problem, C. R. Knowles. Ry. Eng. & Maintenance, vol. 20, no. 1, Jan. 1924, pp. 4-5, 3 figs. Conical bottom tanks provide additional settling capacity required in filtering Mississippi River water.

Decatur, Ill. Effect of the New Impounding Reservoir on Filter Plant Operation at Decatur, W. E. Stanley and E. E. Ruthrauff. Am. Water Wks. Assn.—Jl., vol. 12, no. 1, Sept. 1924, pp. 110-126, 8 figs. Details of gravity type rapid mechanical filtration plant; process involves coagulation with alum, sedimentation, filtration, and sterilization with chlorine; operating records; capacity and loadings; character of river water.

Germany. Rapid Filtering Plant of 30,000 Cubic Meters Daily Capacity for the Neckar Water Works of Stuttgart (Schnellfilteranlage von 30,000 m^3 Tagesleistung für das Neckarwasserwerk Berg der Stadt Stuttgart), E. Link. Gas- u. Wasserfach, vol. 67, nos. 40, 41, and 42, Oct. 4, 11, and 16, 1924, pp. 593-596, 612-616, and 631-632, 18 figs. Water supply; construction of more slow filters, and of a rapid filtration plant at Berg, consisting of settling filtration and chlorination plants; design of rapid plant; tests of new plant.

Hartford, Conn. See FILTERS, SAND, Slow.

Industrial. Industrial Filtration, S. G. Ure. Chem. & Industry, vol. 43, nos. 27 and 40, July 4, and Oct. 3, 1924, pp. 678-686, 14 figs., and 975-983, 13 figs. July 4: Filtration of factory water supply by sand; porous plate filters, bag filters; suction and pressure leaf filters; continuous filters; describes apparatus. Oct. 3: Centrifugal machines; extractors; separators; electrical precipitation.

Levis, Canada. Mechanical Filtration Plant, Levis, Que., E. Hamel. Can. Engr., vol. 47, no. 15, Oct. 7, 1924, pp. 391-393, 5 figs. Old plant replaced by two low lift and four motor-driven high lift centrifugal pumps. New mechanical filter plant has a total capacity of 2¼ million gallons per day with provision for 3 million gallons.

Operation. "Tricks of the Trade" in Filter Plant Operation. Eng. & Contracting (Water, Works), vol. 62, no. 4, Oct. 8, 1924, pp. 783-789, 3 figs. Some of the ordinary practice employed by filtration superintendents in Ohio in conduct of their plants.

Richmond, Va. Features of New Water Filtration Plant at Richmond, Va., W. Donaldson. Eng. News-Rec., vol. 93, no. 16, Oct. 16, 1924, p. 623, 2 figs. Plant built in old coagulating basins provides for mixing and coagulation, mechanical filtration and aeration.

Sacramento, Cal. An Up-to-Date Filtration Plant, A. Givan. Fire & Water Eng., vol. 75, no. 4, Jan. 23, 1924, pp. 161-162 and 176-178, 7 figs. New system installed at Sacramento, Cal.; simple and efficient method of control of filters; lighting plant.

FIRE ALARMS. See ALARM SIGNALING.

FIRE DEPARTMENTS

Machine Shops. See MACHINE SHOPS, Fire-Department.

FIRE ENGINES

British. Fire Protection Service at the British Empire Exhibition. Engineering, vol. 118, nos. 3057, 3063, and 3064, Aug. 1, Sept. 12, and 19, 1924, pp. 153-156, 383-386, and 426-428, 30 figs. Details of fire engines and other fire-fighting equipment on exhibition at Wembley.

Design. Fire-Engine Construction, H. C. Jones. Jr. Instn. Engrs., vol. 35, part 3, Dec. 1924, pp. 111-126, 7 figs. Historical review of fire engine, describing early and modern types.

French. Fire-Protection Systems in France and the United States (Les services de défense contre l'incendie en France et aux Etats-Unis), G. Delanghe. Génie Civil, vol. 84, no. 21, May 24, 1924, pp. 489-494, 11 figs. Describes fire-brigade service in Paris and in American cities, and gives details of high-power fire engine with sedan body constructed by Société SOMUA.

Pumps. See PUMPS, CENTRIFUGAL, Fire.

FIRE EXTINGUISHERS

[See also FIRE FIGHTING, Appliances.]

Carbon Dioxide. Carbon Dioxide in Fire Extinguishing, C. L. Jones. Nat. Fire Protection Assn—Quarterly, vol. 18, no. 2, Oct. 1924, pp. 144-165, 9 figs. Present extent of use of carbon dioxide in fire protection and possible avenues of future development.

Foam. Foam as a Fire Protection (Schuim als brandbluschmiddel), I. J. F. Reydon. Ingenieur, vol. 39, no. 48, Nov. 29, 1924, pp. 951-955, 9 figs. Describes plants built for fire protection of Dutch oil wells in India by means of foam. Experience proves value of method.

Testing of Foam for Use on Fires, C. K. Swift. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 580-582, 1 fig. Describes desirable characteristics of foams and foam solutions; analytical methods applicable to solutions, and methods for comparing fire resistance and other physical characteristics of foams.

See also FIRE FIGHTING, Foam Method.

Sprinkler Heads Assembly Machine. Assembling Sprinkler Heads. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 603-604, 3 figs. Describes automatic machine for expediting assembly of sprinkler heads used in fire-extinguisher systems, and operations performed by the machine.

Types and Proper Uses. Fire Extinguishers and Their Proper Uses, H. L. Pagett. Fire & Water Eng., vol. 75, no. 2, Jan. 9, 1924, pp. 59-60 and 86-88. Classification of various types as to fires they are best suited to extinguish; arranged in three general classes of fires.

First Aid Fire Appliances, Chas. R. D'Olive. Coal Mine Mgmt., vol. 3, no. 1, Jan. 1924, pp. 32-36 and 63. Describes various types of fire extinguishers.

U. S. Specifications. United States Government Master Specification for Fire-Extinguishing Liquid (Carbon Tetrachloride Base). U. S. Bur. Standards—Circular no. 134, June 1, 1924, 6 pp. Specifications adopted July 3, 1924, for fire-extinguishing liquid (carbon tetrachloride base), covering material and workmanship, inspection and testing, packing and marking, etc.

FIRE FIGHTING

Appliances. Merryweather Fire Appliances at the British Empire Exhibition. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 530-531, 3 figs. Describes modern machines for fire fighting, including suds-producing apparatus, portable fire extinguisher, fire and salvage pumps, etc.

Chemical Fires. Chemical Fires and How They Should Be Handled. Fire & Water Eng., vol. 75, no. 11, Mar. 12, 1924, pp. 493-494 and 520. Hazards due to chemicals; prevention of such fires; storage of chemicals; fighting chemical fires; poisonous gases. Report of Committee of Indiana Sec., Am. Chem. Soc.

Equipment. Fire Apparatus Other Countries Are Using. Fire & Water Eng., vol. 75, no. 17, Apr. 23, 1924, pp. 841 and 879-882, 6 figs. Conditions prevailing in foreign countries as regards matter of fire-fighting and facilities which they have for this purpose. How American apparatus are regarded.

Fire-Fighting Equipment for Chemical Works, H. Seymour. Chem. Age (Lond.), vol. 11, no. 276; Sept. 27, 1924, pp. 320-321. Review of steps which may be taken to control and extinguish fires in manufacturing plant, particularly urging necessity of attacking fire at outset.

Fire-Escape Ladder. A New Motor Turntable Fire Escape. Motor Transport (Lond.), vol. 38, no. 995, Mar. 24, 1924, pp. 353-354, 5 figs. Describes ladder, all movements of which are controlled by hydraulic power; mounted on a Merryweather standard 65-hp. chain-driven chassis and embodying latest design of Merryweather escape ladder and trussing.

Foam Method. Fighting Fires by Means of the Foam Method (Feuerbekämpfung vermittels des Schaumlöschverfahrens), B. Müller. Gesundheits-Ingenieur, vol. 47, no. 32, Aug. 9, 1924, pp. 351-352, 1 fig. Details of system in which objects on fire are covered by a foam containing carbonic acid which forms a protective crust. Stationary plants for protection of liquids, also portable apparatus.

Lignite Mines. See LIGNITE, Fires in Mines.

FIRE-HOSE COUPLINGS

Screw Threads for. See SCREW THREADS, Standards.

FIRE PREVENTION

Industrial Plants. Modern Maintenance of Plant and Equipment, W. G. Ziegler. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 6-13, 14 figs. Fire and accident prevention in industrial plants.

Methods. Development of Fire Prevention in Industry (Die Entwicklung des Feuerschutzes in der Industrie). Braunkohle, vol. 23, no. 20, Aug. 16, 1924, pp. 392-400. Discusses means for preventing or controlling fires, fire alarms, fire-brigade activity, fire extinguishers, etc.

Oil Fields. See OIL FIELDS, Fire Prevention.

Oil Tanks. See OIL TANKS, Fire Prevention.

FIRE PROTECTION

[See also FIRE FIGHTING.]

Alarm System. The "Gravity" Fire Alarm System. Colliery Guardian, vol. 128, no. 3326, Sept. 26, 1924, p. 811, 3 figs. Describes automatic fire-alarm system, dependent solely upon gravity for its motive power.

Building Design. Fire Protection in Building Design, E. A. Barrier and J. O. Taber. Boston Soc. Civ. Engrs.—Jl., vol. 11, no. 3, Mar. 1924, pp. 85-106 and (discussion) 106-108, 3 figs. By E. A. Barrier: Early types of construction; interior construction; laboratory tests; vertical openings, partitions and fire walls; protection against outside exposure. By J. O. Taber: Exposure from external fires; design within building; ideal fire protection; Boston fire department.

Dyestuff Plants. Causes of Fire in Dyestuff Plants, Wm. D. Milne. Chem. & Met. Eng., vol. 30, no. 10, Mar. 10, 1924, pp. 388-390. Chem. & Met. Eng., vol. 30, no. 10, Mar. 10, 1924, pp. 388-390. Analysis of 134 such fires indicates what precautions are necessary in avoiding disaster.

Fire Engines. See FIRE ENGINES.

Fire Extinguishers. See FIRE EXTINGUISHERS.

Marine Terminals. See TERMINALS, MARINE, Fire Protection.

Metal Lath as. See BUILDING CONSTRUCTION, Metal Lath for Fire.

Piers. See PIERS, Fire Protection.

Principles. Principles of Fire Protection, R. S. Newell. Tech. Eng. News, vol. 4, no. 9, Mar. 1924, pp. 358-359, 374 and 376, 2 figs. Deals with vertical openings, concealed spaces, and unprotected wall openings; chemical extinguishers, standpipes and hose, automatic sprinkler protection, etc.

Sprinklers. How the Fire Chief Regards Automatic Sprinklers, I. G. Hoagland. Fire & Water Eng., vol. 76, no. 6, Aug. 6, 1924, pp. 253-254 and 278-279. Replies to questionnaire asking for facts as to use chiefs make of this device; opinion as to its usefulness.

Some Things to Know About a Sprinkler System, C. C. Brown. Fire & Water Eng., vol. 75, nos. 3 and 5, Jan. 16 and 30, 1924, pp. 113-114, 118-119 and 134-135; and 209-210 and 232. Discusses all phases connected with proper installation and maintenance of automatic sprinklers.

See also MACHINE TOOLS, Sprinkler-Head Assembly Machine.

Theaters. See THEATERS, Fire Protection.

Timber-Treating Plants. Securing Proper Fire Protection for Timber Treating Plants. Ry. Eng. & Maintenance, vol. 20, no. 12, Dec. 1924, pp. 487-489. Discusses recommended practices and equipment necessary to prevent losses.

Water Curtain. The Water Curtain as a Protection Against Conflagration, M. W. McIntyre. Fire & Water Eng., vol. 75, no. 1, Jan. 2, 1924, pp. 15-16 and 34, 5 figs. Describes system in use in large building in Cincinnati, Ohio, and method employed in testing system's efficiency.

Water-Distribution-System Requirements. Fire Protection Requirements in Distribution System Design, V. B. Siems and D. B. Biser. Am. Water Wks. Assn.—Jl., vol. 11, no. 1, Jan. 1924, pp. 17-37, 8 figs. Flow test on fire hydrants for judging ability of a water system to furnish territory it supplies with adequate fire protection. Factors of distribution efficiency.

Water Supply for. See WATER SUPPLY, Fire-Protection.

FIREBRICK

Checker Brick, Characteristics. Investigating Firebrick for Use in Gas Manufacture, Claude C. Brown. Gas Age-Rec., vol. 54, no. 14, Oct. 4, 1924, pp. 459-462, 6 figs. Composition and its influence; softening point; analysis of various bricks; properties of checker brick; heat-storage capacity.

Ground. See BOILER FURNACES, Ground Firebrick for Repair.

Heat Transmission Through. The Influence of Texture on the Transmission of Heat through Firebricks, A. T. Green. Ceramic Soc.—Trans., vol. 23, part 3, 1923-24, pp. 253-279, 11 figs. Details of experiments made with object of testing suggestion that rate of heat transmission through certain refractory materials is dependent, in some degree, on temperature and texture of material, in a manner contrary to a general expectation. Reprinted by permission of Brit. Refractories Research Assn., from Bul. no. 6, Apr. 1924.

Manufacture, Refractory-Clay Preparation. Preparation of Refractory Clay for Fireproof Bricks and Hollowware (Die Aufbereitung der Schamottemasse für feuerfeste Steine, Kapseln, Muffeln und Glashäfen), H. Hecht. Tonindustrie-Zeitung, vol. 48, no. 51, June 25, 1924, pp. 557-559, 6 figs. Discusses crushing and sorting plants, mixing machines, etc.

Materials, Softening Temperature Under Load. Influence of the Grain Sizes on the Softening Temperature of Firebrick Materials Under Load (Ueber die Abhängigkeit der Erweichungstemperatur von Schamottematerialien unter Belastung von der Korngrösse der verwendeten Schamotte), H. Navratiel. Berichte der Deutschen Keramischen Gesellschaft, vol. 4, nos. 5-6, Apr. 1924, pp. 192-196. Tests prove that finer grains will increase temperature under which "fireproof" materials soften when subjected to load.

Porosity. Determination of Porosity of Firebrick (Porositätsbestimmungen an feuerfesten Steinen), E. Steinhoff and M. Mell. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Werkstoffausschuss), no. 44, Apr. 4, 1924, 6 pp., 3 figs. Examines six processes. Advantages of mercury displacement process. Describes new apparatus for its application.

Properties. The Thermal Conductivity and some other Properties of two Commercial, Heat-Insulating Bricks used in Kiln Construction, A. T. Green. Ceramic Soc.—Trans., vol. 23, part 3, 1923-24, pp. 271-276, 1 fig. Results of experiments with two batches of commercial heat-insulating material, undertaken to determine thermal conductivity and a few other properties of a practical significance. Reprinted by permission Brit. Refractories Research Assn., from Bul. no. 5, Dec. 1923.

Sizing Machine. New Process Sizes Fire Brick. Brick & Clay Rec., vol. 64, no. 9, Apr. 29, 1924, p. 649, 2 figs. Machine and method developed by Ashland (Ky.) Fire Brick Co. for producing brick of uniform thickness.

Tests. High Temperature Load and Fusion Tests of Fire Brick from the Pacific Northwest in Comparison with Other Well-Known Fire Brick, H. Wilson. Am. Ceramic Soc.—Jl., vol. 7, no. 1, Jan. 1924, pp. 34-51, 10 figs. Results of tests made on 17 samples of fireclay brick from Pacific Northwest with 27 other commercial brands of fireclay, silica, magnesia, chromite, zirconia, diaspore, silicon carbide and crystalline alumina, as well as china clay and crystalline sillimanite products made at Univ. of Wash.

FIRECLAYS

Analysis. Fireclays. Foundry Trade Jl., vol. 30, no. 426, Oct. 16, 1924, p. 342. Method of analysis.

Properties. The Properties of Fireclay. Foundry Trade Jl., vol. 30, no. 420, Sept. 4, 1924, pp. 195-199, 1 fig. Abstracts of portions of book "Refractory Materials: Fireclays, Analyses and Physical Tests," written as a special report on mineral resources of Great Britain by F. R. Ennos and A. Scott. Deals with mineralogical composition, changes during firing, effect of impurities on properties, refractoriness in relation to chemical composition, influence of chemical analyses on refractoriness, etc.

Reversible Thermal Expansion. Note on the Influence of Rapid Cooling on the Reversible Expansion of Fireclay, H. S. Houldsworth. Soc. Glass Technology—Jl., vol. 8, no. 29, Mar. 1924, pp. 30-36 and (discussion) 36-38, 4 figs. Details of tests made.

FIREDAMP

Detectors. Firedamp Detectors. Iron & Coal Trades Rev., vol. 109, nos. 2946, 2947, 2948, and 2949, Aug. 15, 22, 29, and Sept. 5, 1924, pp. 267-268, 312-314, 351-352, and 403, 24 figs. Discusses formation of gas cap, devices based on increase in size of flame, apparatus based on explosion, apparatus based on vacuum after combustion, combustion by catalysers, detecting methane by its low density, dynamic detectors, optical detectors, acoustic detectors, electrical indicators, detection of firedamp through its irrespirability and detection of methane by its other less-known properties.

Ignition. Ignition of Firedamp by Lamps and Explosives, E. Lemaire. Colliery Guardian, vol. 128, no. 3318, Aug. 1, 1924, pp. 287-288, 3 figs. Covers ignition of firedamp by explosives and safety lamps, flame photographs of explosives, shots fired in free air, temperature of detonation. Translated from Annales des Mines de Belgique.

The Ignition of Firedamp by the Filaments of 2 Volt Electric Lamps. Colliery Guardian, vol. 128, no. 3314, July 4, 1924, p. 28. Experiments being carried out to determine with greater accuracy factors upon which ignition of mixtures of methane and air by hot wires depends.

The Ignition of Firedamp by Lamps and Explosives (Inflammation du grisou par les lampes et les explosifs), Lemaire. Annales des Mines de Belgique, vol. 25, no. 1, 1924, pp. 3-21, 18 figs. Experimental work; photographs of explosive flames; tests made in firing in free air; temperature of detonation; ignition by safety lamps; etc.

Indicators. Firedamp Indicator (Schlagwetteranzeiger), H. Schultze-Rhonhof. Glückauf, vol. 60, nos. 21, 22, and 23, May 24, 31, and June 7, 1924, pp. 415-420, 444-447, and 468-472, 26 figs. Summary description of all methods suggested to determine presence of methane in mines, depending on (1) proof of presence by capacity of methane to combine with oxygen and giving off heat; (2) proof by the smaller density of firedamp; numerous methods under each.

Firedamp Indicators. Colliery Eng., vol. 1, no. 7, Sept. 1924, pp. 334-337, 5 figs. Review of methods devised for detection of firedamp and carbon dioxide in mines.

Measuring. The Delbrouck Apparatus. Colliery Engr., vol. 1, no. 5, July 1924, pp. 209-210. Details of apparatus based on reduction in pressure following on combustion of mixture of methane and air in closed vessel, satisfactorily operating in Charbonnage de Wèrister, near Liège.

Testing for. Testing for Firedamp. Colliery Guardian, vol. 127, nos. 3292, 3293, 3294, 3295, and 3296, Feb. 1, 8, 15, 22, and 29, 1924, pp. 275, 342-343, 421, 471-472, and 556-557, 10 figs. Report of Miners' Lamps Committee. Deals with various methods of estimating presence of firedamp, and discusses experiments carried out with different flame lamps under varying conditions.

See also Indicators.

FIRES

Loss Statistics. Fire Loss Statistics for 1923. Fire & Water Eng., vol. 75, no. 25, June 18, 1924, pp. 1315-1317, 1319-1320, 1322-1323, and 1351. Tabulation showing number of alarms, number of fires in various types of buildings, how controlled, property values, losses, etc.

FISHING BOATS

Gas-Powered. Gas-Powered Fishing Boats (Les bateaux de pêche à moteurs). Bul. Technique du Bureau Veritas, vol. 5, nos. 9 and 10, Sept. and Oct. 1923, pp. 173-180 and 196-199, 17 figs. Notes on dimensions and tonnage of boats used in France, Great Britain, Holland, Norway, Denmark, and Sweden, with particulars regarding types of engines installed.

FITS

British Standards. German Locomotive Works Uses British Limits and Fits (Masznahmen einer deutschen Lokomotivfabrik zur Anwendung der englischen Passungsnormen), T. Damm. Werkstattstechnik, vol. 18, no. 18, Sept. 15, 1924, pp. 481-484, 6 figs. Details of limits and fits of British Eng. Standards Assn. and interchangeable parts adopted by Hannover Machine Works.

Press, Design of. The Design of Safe Press Fits, Jos. K. Wood. Am. Mach., vol. 61, no. 25, Dec. 18, 1924, pp. 943-946, 2 figs. Limiting values of fit stresses for various fit allowances for cast and forged steel; definite conclusions concerning radial, tangential, and combined shearing stresses.

Shrink. See LOCOMOTIVES, Tires, Shrink Fits.

FIXTURES

Assembling. See AUTOMOBILE ENGINES, Assembling Fixtures.

FLAME PROPAGATION

Spark Intensity. Flame Speed and Spark Intensity, D. W. Randolph and F. B. Silsbee. U. S. Nat. Advisory Committee for Aeronautics—Report no. 187, 1924, 14 pp. 7 figs. Describes series of experiments undertaken to determine whether or not electrical characteristics of igniting spark have any effect on rapidity of flame spread in explosive gas mixture which it ignites. Results show that no such effect exists. Flame velocity in carbon-monoxide-oxygen, acteylene-oxygen, and gasoline-air mixtures was found to be unaffected by changes in spark intensity ranging from sparks which were barely able to ignite mixture up to intense condenser-discharge sparks having 50 times this energy.

FLAMES

Jet. Jet Flames, W. Payman. Fuel, vol. 3, no. 11, Nov. 1924, pp. 403-406, 1 fig. Study of flames produced by gases issuing from jets without primary aeration.

Speed of Nitrogen Dilution and. The Influence of Nitrogen Dilution on the Speed of Flame, C. Campbell and O. C. de C. Ellis. Chem. Soc.—Jl., vol. 125, Sept. 1924, pp. 1957-1963, 4 figs. Results of experiments.

FLANGING MACHINES. See BOILERMAKING, Flanging Machine; LOCOMOTIVE BOILERS, Boiler-Sheet Flanging Machine.

FLAX

Retting. An Experimental Study of Flax Retting, J. V. Eyre and C. R. Nodder. Textile Inst. —Jl., vol. 15, no. 5, May 1924, pp. T237-T272, 24 figs. Development of acidity during retting of flax: its interpretation and technical significance.

FLIGHT

[See also AVIATION.]

Curvilinear. Airplanes in Horizontal Curvilinear Flight, H. Kann. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 174, Jan. 1924, 25 pp., 12 figs. Gives simple method of calculation, and indicates method for determining area

of aileron and rudder surfaces. Translated from Technische Berichte, vol. 3, no. 7

Curvilinear Flight of Airplanes, E. Salkowski. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 176, Jan. 1924, 21 pp., 6 figs. on supp. pages. Results of investigation by Hoff, Hopf, and writer. Describes method of calculation without any assumption in regard to variation of engine power with altitude and only with assumption that this relation is, in fact, empirically known from measurements taken in altitude tests. Translated from Technische Berichte, vol. 3, no. 7, pp. 267-274.

Elements of, Calculation. General Method and Chart for Calculating Elements of Airplane Flight (Méthode générale et abaque pour calculer les elements du vol d'un avion), G. Delanghe. Génie Civil, vol. 84, no. 2169, Mar. 8, 1924, pp. 222-216, 8 figs. Describes new method developed by author.

Fuel Economy in. Fuel Economy in Flight, H. T. Tizard. Roy. Aeronautical Soc.—Jl., vol. 28, no. 166, Oct. 1924, pp. 604-624, 7 figs. Author discusses following questions into which he divides problem: (1) What are principles governing most economical use of airplane in flight, having regard to weather conditions; (2) What are principles underlying design of airplanes to secure maximum efficiency of operation?

Gliding. Difference between the Piloting of Gliders and Motor Airplanes from the Standpoint of the Practical Glider Pilot (Unterschied zwischen der Führung von Segel- und Motorflugzeugen vom Standpunkt des praktischen Segelfliegers), H. Hackmack. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 1-2, Jan. 26, 1924, pp. 2-3. Offers practical suggestions for motorless flight.

Gliding Flight (Le vol à voile), H. Liurette, Vie Technique & Industrielle, vol. 6, no. 52, Jan. 1924, pp. 234-240, 20 figs. Mechanism of gliding flight; influence of weight on speed; laboratory experience; internal energy of a bird against that of wind.

Gliding Flight against the Wind (Sur le vol à voile contre le vent), A. Rateau. Académie des Sciences—Comptes Rendus, vol. 178, no. 3, Jan. 14, 1924, pp. 280-285, 1 fig. Author demonstrates that Katzmayr effect can be deduced immediately from what is already known of wing characteristics in fixed regular current; formula obtained gives principal laws of Katzmayr effect.

Scientific Principles and Prospects of Motorless Flight (Wissenschaftliche Grundlagen und Aussichten des motorlosen Fluges), A. Pröll. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 557-561, 6 figs. General mechanical principles of gliding flight and of static and dynamic soaring flight; constructive peculiarities and performances of soaring planes; applications of soaring flight for scientific and traffic purposes.

See also Soaring.

High-Altitude. High Altitude Flying, P. B. King and Thos. Carroll. U. S. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 193, May 1924, 7 pp. Discusses use and abuse of oxygen equipment and its influence upon physical comfort and efficiency of pilot while engaged in flights above 15,000 ft.; suggestions for diet and warm clothing; effect of low temperature on interplane and control wires, and upon control bearing surfaces due to coagulation of lubricant.

Lift and Drag. The Elements of the Lanchester-Prandtl Theory of Aeroplane Lift and Drag. Engineering, vol. 117, nos. 3027, 3028, 3030, 3032, and 3035, Jan. 4, 11, 25, Feb. 8 and 29, 1924, pp. 1-3, 35-37, 100-102, 169-171, and 258-260. 34 figs. Describes development of Lanchester's views into rational and practical theory of airplane by Professor Prandtl.

Measurements. Flight Measurements During the Rhön Glider Competition, 1923 (Die Arbeiten des Messtrupps während des Rhönsegelflug-Wettbewerbs 1923), H. Koschmieder, P. Dubois and Wg. Kaempfert. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 1-2, Jan. 26, 1924, pp. 3-8, 6 figs. Describes method of measuring path of flight of gliders by observers; determination of vertical wind velocity, and results.

Motorless. See Gliding.

Soaring. The Soaring Flight Question, E. H. Hankin. Instn. Aeronautical Engrs.—Minutes of Proceedings No. 8, 1923, pp. 23-30 and (discussion) 31-38, 1 fig. Explanation of some of reasons why discoveries which appear to combat existing theories meet with opposition.

See also Gliding.

FLOOD CONTROL

Kilbourn, Wis. River Regulation Determined by Hydraulic Experiments. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 429-431, 4 figs. Bank erosion on Wisconsin river at Kilbourn, Wis., due to flood flow over dam of Southern Wisconsin Power Co., has been overcome by construction of a concrete training wall, location of which was determined largely by experiments made at hydraulic laboratory of Univ. of Wis.

Los Angeles County, Cal. Water Conservation Program for Los Angeles County. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1088-1090, 1 fig. A flood control and water conservation program involving a score or more separate engineering projects is now under way in Los Angeles County, Cal., as result of recent election at which bonds for this work totaling $35,300,000 were voted; works contemplated laid out to provide flood protection and storage and replenish underground sources. Outline of general flood control situation and list of works included in recently approved budget.

Louisiana. See DRAINAGE, Louisiana.

Mississippi River. Keeping the Mississippi within Bounds, R. P. Howell. Military Engr., vol. 16, no. 88, July-Aug. 1924, pp. 283-291, 9 figs. How Mississippi delta was formed. Discusses protection from floods by means of artificial dikes of earth, or levees, including progress in levee construction.

Projects, Wichita, Kan. Floods and Flood Protection Projects at Wichita, P. L. Brockway. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 828-832, 5 figs. Three streams in city complicate problem; four floods and numerous overflows in semi-arid region; channel improvements and dikes; bridges to be rebuilt and raised; rainfall records.

Sacramento River, Cal. Flood Control for Sacramento River, O. G. Stanley and W. M. Coffey. Military Engr., vol. 16, no. 89, Sept.-Oct. 1924, pp. 368-373, 7 figs. Plan for improving navigability, deepening channels and protecting banks of rivers and affording relief from flood; portion of project complete.

Seine River, France. The Flooding of the Seine River in January 1924 and in 1910 (Le crues de la Seine en Janvier 1924 et 1910), A. Bidault des Chaumes. Génie Civil, vol. 84, no. 4, Jan. 26, 1924, pp. 77-82, 11 figs. Describes protective works constructed in Paris and vicinity since 1910, and their effectiveness during recent high-water period.

The Regulation of the River Seine. Engineering, vol. 118, no. 3072, Nov. 14, 1924, pp. 682-684, 3 figs. Remedial measures against floods undertaken between Paris and Rouen.

FLOODS

Control. See FLOOD CONTROL.

Flow Characteristics. Flood Flow Characteristics, C. S. Jarvis. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 10, Dec. 1924, pp. 1545-1581, 9 figs. Characteristics of flood flow that may have either general or special application are stated, by way of indicating methods of deduction that must be followed; available data that seemed reliable and valuable have been listed and plotted to give visual representation of range of discharge per sq. mi. for maximum recorded floods; method of attack by which problems in several central and western districts have been solved satisfactorily, both as to prevention of floods and protection of property.

Flows, New England Rivers. Flood Flows of New England Rivers, C. H. Pierce. Boston Soc. Civ. Engrs.—Jl., vol. 11, no. 8, Oct. 1924, pp. 327-375, 3 figs. Compilation of data for number of rivers; principal floods of Connecticut River, 1619-1924, from data compiled by late Arthur Watson.

Forestry and. See FORESTRY, Relation to Floods.

Panama Canal. A Great Flood in the Panama Canal, J. J. Morrow. Military Engr., vol. 16, no. 86, Mar.-Apr. 1924, pp. 100-107, 7 figs. Notes on the various utilities attacked, and description of fight against flood.

FLOORS

Areas, Limitations on. See BUILDING CONSTRUCTION, Floor Areas, Limitation of.

Asphalt. See ASPHALT, Natural-Rock.

Concrete Beams as Ceiling. Saving Money by Leaving Concrete Floorbeams as Ceiling, Rob. D. Snodgrass. Eng. News-Rec., vol. 93, no. 16, Oct. 16, 1924, pp. 630-631, 1 fig. Points out that economy and appearance may both be served in concrete buildings by discarding flat-ceiling idea.

Factory. What is the Best Factory Floor Surface? A. B. MacMillan. Contract Rec., vol. 38, nos. 49, 50, 51, and 52, Dec. 3, 10, 17, and 24, 1924, pp. 1188-1190, 1208-1210, 1228-1230, and 1228-1254, 7 figs. Discussion of the various kinds of flooring and advantages, disadvantages and special uses of each.

Girderless Flat-Slab. Modern Designs of Reinforced-Concrete Girderless Flat-Slab Floors (Neuere Ausführungen trägerloser Eisenbetondecken), A. Spilker. Bauingenieur, vol. 5, no. 6, Mar. 31, 1924, pp. 141-145, 7 figs. Gives examples of girderless floors constructed by firm of Schäffer & Co. Duisburg-Bremen.

Modern Examples of Girderless Flat-Slab Floors (Neuere Ausführungen trägerloser Pilzdecken), H. Marcus. Bauingenieur, vol. 5, no. 7, Apr. 15, 1924, pp. 171-177, 15 figs. Report on progress made in application and design of such floors.

Hollow Cinder Block. Heavy Test Loads on Hollow Cinder Block Floor Slabs Cause Slight Permanent Deflection. Concrete, vol. 24, no. 4, Apr. 1924, pp. 135-137, 13 figs. Tests made on test floors poured Dec. 15, 1923, inside of one of the buildings of Indianapolis Switch & Frog Co., at Springfield, Ohio, to determine strength of slabs constructed according to McIlroy fireproof floor system.

Linoleum. See LINOLEUM.

Loads, Swaying-Crowd. Strain of Swaying Crowds on Balcony Measured at Iowa. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, p. 231. Stress measurements in balcony floor at Iowa State College show load effect more than doubled by jumping of excited, cheering students.

Railway Buildings. See RAILWAYS, Buildings, Floors for.

Transparent. Tests on the Resistance of Transparent Floors (Essais de résistance de dalles transparentes). Génie Civil, vol. 84, no. 5, Feb. 2, 1924, pp. 109-110, 3 figs. Results of tests on floors made of glass units with thickness of 10 cm. and max. diam. of 145 mm. set in reinforced concrete; they are said to be as transparent as floors made entirely of glass.

FLOTATION

Agents, Selection of. A Basis for Selecting Flotation Agents, H. E. Fredrick. Eng. & Min. Jl.—Press, vol. 118, no. 1, July 5, 1924, pp. 11-12. Observations in practice indicate that their colloidal condition and electrostatic charges have important bearing on results; two classes of compounds afford ample choice.

Capillary Phenomena. Capillary Phenomena (Ueber kapillare Erscheinungen), K. Schultze. Kolloid-Zeit., vol. 35, no. 2, Aug. 1924, pp. 76-86, 24 figs. General discussion of function of roughness and curvature of surface of solids in capillary phenomena, with especial reference to flotation and filtration processes; attempt is made to classify different types of surface; investigation of more easily reproducible types of capillary openings, and examination of capillary force, movement of liquid in capillaries, and height to which it rises.

Coal-Washing Processes. See COAL WASHING, Flotation Processes.

Copper Ore. Selective Flotation at Nacozari, W. T. MacDonald. Eng. & Min. Jl.-Press, vol. 118, no. 12, Sept. 20, 1924, pp. 445-454, 11 figs. Describes methods developed by Moctezuma Copper Co. at Nacozari, Sonora, Mexico, and results obtained.

Cyanide in. Cyanide in Flotation, W. E. Simpson. Min. Mag., vol. 30, no. 1, Jan. 1924, pp. 24-25. It has been discovered recently at Sullivan lead-zinc mine, British Columbia, that addition of sodium cyanide to an alkaline flotation circuit increases selective action of reagents which separate galena from blende. Details of Sullivan mine and ore.

Electrometer Tests. Electrometer Tests in Flotation, T. M. Bains, Jr. Eng. & Min. Jl.-Press, vol. 117, no. 22, May 31, 1924, pp. 885-886, 3 figs. Simple experiments indicating advisability of further work on electrostatic charges.

Minerals. Capacity of Adsorption and Flotation Capacity of Various Minerals (Ueber Adsorptions- und Flotationsvermögen verschiedener Mineralien), W. Schäfer. Metall u. Erz., vol. 21, no. 17, Sept. 1, 1924, pp. 401-404. Shows that adsorption and flotation capacities do not always go hand in hand, in some minerals they vary inversely.

Oil. Separation of Chemicals and Minerals by Oil Flotation and the Removal of Oil from Chemicals (Ueber Trennung von Chemikalien und Mineralien und Entölung von Chemikalien nach den beim Schwimmaufbereitungsverfahren der Erze gewonnenen Erfahrungen), J. Traube, A. Kieke, O. Bartsch and K. Nishizawa. Chemiker-Zeitung, vol. 48, nos. 109 and 114, Sept. 9 and 20, 1924, pp. 633-634 and 673-674. Shows that ease with which many organic substances are wetted with water depends chiefly on their relative solubility; addition of oily substances to suspensions of these substances causes more or less perfect flotation.

Ores. Flotation of Metallic Ores (La flotation des minerais métalliques, A. Fischbacher. Revue de l'Industrie minérale, no. 94, Nov. 15, 1924, pp. 523-532, 4 figs. Theory of simple and differ-

ential flotation and its practical application to galenas, blende, chalcopyrite, etc.

Notes on Flotation Test Work at Anyox on Granby Ores, A. C. Halferdahl. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 711-713. Results of laboratory study and experimentation.

Processes. Study of Processes of Flotation (Zur Kenntnis der Schwimmverfahren), E. Berl and W. Pfannmüller. Kolloid Zeit., vol. 34, nos. 6 and 7, June and July 1924, pp. 328-332 and 34-40 and vol. 35, no. 2, Aug. 1924, pp. 106-111. June: Behavior of silicic acid in flotation. July: Behavior of oxides, carbonates, and sulphates. Aug.: Behavior of alumina in process; enrichment of phosphates by flotation.

Selective. Selective Flotation as Applied to Canadian Ores, C. S. Parsons. Min. Jl., vol. 145, nos. 4628 and 4629, May 3, and 10, 1924, pp. 355-356 and 380-381. See also Can. Chem. & Met., vol. 8, no. 8, Aug. 1924, pp. 187-190, and Can. Min. Jl., vol. 45, no. 17, Apr. 25, 1924, pp. 404-407. Reviews in a general way results of investigations conducted in Ore Dressing & Metallurgical Laboratories of Dept. Mines at Ottawa that have particular reference to selective flotation as applied to Canadian ores. Oils used, addition reagents, control of flotation pulp; examples of problems, examples of selective flotation.

The Selective Flotation of the Lower Grade Nickeliferous Pyrrhotite Ores of Ontario, W. B. Timm. Can. Min. Jl., vol. 45, no. 24, June 13, 1924, pp. 577-580. Details of experiments and results obtained.

Surface Reactions in. Surface Reactions in Flotation, A. W. Fahrenwald. Am. Inst. Min. & Met. Engrs.—Trans., no. 1283-M, Jan. 1924, 90 pp., 20 figs. Results of research on theory of flotation that extended over three years. Surface tension elucidated and made basis of oil adsorption determinations; studies condition of small quantities of numerous flotation oils and pure organic substances dissolved or mixed with water; effects of several controlling agents on various mineral suspensions in water; experiments dealing with ion-adsorption, flocculation, and peptization of various mineral suspensions; etc.

Theory of Process. Theory of the Flotation Process (Beitrag zur Theorie des Schaumschwimmverfahrens), O. Bartsch. Kolloidchemische Beihefte, vol. 20, no. 1-5, Oct. 15, 1924, pp. 50-77, 1 fig. Essential condition for flotation is formation of flocculent aggregates of air bubbles and solid particles; it is shown that this action depends on special capillary charges; by electro-endosmotic experiments it was found that gangues and ores, with exception of heavy spar, were negatively charged and that gangues were more negative than ores.

Xanthate, Analysis of. The Analysis of Xanthate, W. S. Calcott, F. L. English and F. B. Downing. Eng. & Min. Jl.-Press, vol. 118, no. 25, Dec. 20, 1924, pp. 980-981. Use of xanthate in concentration of sulphide ores by flotation has now become widespread. Describes a method of analysis and its application. Procedure for qualitative tests and for xanthate determination. Experimental data on use of method.

FLOUR

Milling. Grain Milling, T. Macdonald. S. African Instn. Engrs.—Jl., vol. 23, no. 5, Dec. 1924, pp. 324-328 and (discussion) 328-330. Résumé of history of flour milling. Describes milling of wheat.

FLOUR MILLS

Conveyors. See CONVEYORS, Flour Mills.

Design and Layout. The Construction of Flour Mills and Granaries (Ueber den Bau von Mühlen und Speichern), O. Orlishausen. Fördertechnik u. Frachtverkehr, vol. 17, no. 4, Feb. 21, 1924, pp. 37-41, 6 figs. Suggestions for design and layout of buildings based on years of practical experience.

Diesel-Engine-Driven. America's Largest Diesel-Driven Flour Mill. Oil Engine Power, vol. 2, no. 2, Feb. 1924, pp. 80-84, 4 figs. How Red Star Mill, Wichita, Kan., effected pronounced economies by gradually discarding old steam machinery in favor of modern oil-engine power, which rendered them independent of local electric supply.

Heating, By-Product. See HEATING, Flour-Mill.

Hungary. New Buildings for the Flour Industry of Hungary (Neubauten für die Mühlenindustrie in Ungarn), W. Obrist. Schweizerische Bauzeitung, vol. 84, no. 11, Sept. 13, 1924, pp. 127-131, 10 figs. Details of design and construction of grain silos and flour magazines at Karczag and Selyp.

Rolls. Serrating and Polishing of Cylinders for Flour Mills (Rigatrici e smerigliatrici per cilindri di laminatoi da grano), E. Ascione. Industria, vol. 38, nos. 16, 17, 19, and 20, Aug. 31, Sept. 15, Oct. 15, and Oct. 31, 1924, pp. 437-438, 474-476, 529-530, and 550-554, 23 figs. Discusses serrating of cylinders for crushing mills and polishing of cylinders for grinding mills; correct shape of teeth and how to calculate it; describes Bühler double serrating apparatus; combined serrating and polishing machine of Bühler Brothers, Uzwill.

FLOW IN PIPES

Fluids. See FLOW OF FLUIDS, Pipes.

Gases. See FLOW OF GASES, Pipes.

Steam. See FLOW OF STEAM.

Water. See FLOW OF WATER, Pipes.

Water and Air Simultaneously. Simultaneous Flow of Water and Air in Pipes, L. S. O'Bannon. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 3, Mar. 1924, pp. 225-234, 14 figs. Describes experiments made to find capacity of pipes for carrying water and air simultaneously, within conditions of steady flow; results and methods of running experiments described under four following heads: Flow of water, flow of air, parallel flow of water and air, and counter flow of water and air.

FLOW METERS

Electrically-Operated. The Electrically Operated Flow Meter, R. E. Woolley. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 182-187, 8 figs. Reasons that gave rise to its development; description of complete device, function of its parts, its general principle of operation, and its applications.

Liquids. See FLOW OF LIQUIDS, Liquid Meters.

FLOW OF AIR

Around Cylinders. The "Magnus" Effect. Engineer, vol. 138, no. 3595, Nov. 21, 1924, p. 589, 5 figs. Discusses nature of Magnus effect which is alleged to be employed by A. Flettner for propulsion of his wind-power ship Buckau.

Measurement. See ANEMOMETERS.

Mines. Experiments on the Flow of Air in Mines, D. Penman and J. S. Penman. Min. Inst. of Scotland—Trans., vol. 45, part 3, 1924-25, pp. 60-74 and (discussion) 74-76, 15 figs. See also Instn. Min. Engrs.—Trans., vol. 45, part 2, Nov. 1924, pp. 151-165 and (discussion), 165-167, 15 figs., and (abstract) Iron & Coal Trades Rev., vol. 109, no. 2956, Oct. 24, 1924, pp. 664-665, 3 figs. Conditions and nature of flow of air; factors influencing critical velocity of flow; experiments on flow of air in tubes; experiments at

Wellesley Colliery; and tests of mining laboratory fans.

Pipes. See FLOW IN PIPES; FLOW OF FLUIDS, Pipes; FLOW OF GASES, Pipes.

Resistance to Falling Spheres. The Resistance of Air to Falling Spheres, Rob. G. Lunnon. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 277, Jan. 1924, pp. 173-182, 1 fig. Investigates fall of small steel balls in coal-mine shafts and gives results for dry, still air.

Return Lines. See FLOW OF WATER, Return Lines.

FLOW OF FLUIDS

Air. See FLOW OF AIR.

Apparent Mass, Factors of. Some Tables of the Factor of Apparent Additional Mass, M. M. Munk. U. S. Nat. Advisory Comm. for Aeronautics —Tech. Notes, no. 197, July 1924, 7 pp. Collection of tables of factor of apparent mass of immersed solid, published up to present date.

Dynamic Similarity, Principle of. The Principle of Dynamical Similarity, with Special Reference to Model Experiments, A. H. Gibson. Engineering, vol. 117, nos. 3037, 3038, 3039, and 3040, Mar. 14, 21, 28, and Apr. 4, 1924, pp. 325-327, 357-359, 391-393, and 422-423, 6 figs. Discusses application of principles to flow of fluid through pipes, resistance of wholly submerged and partially submerged bodies; model experiments on resistance of ships; resistance of smooth wires and cylinders; estuary model experiments; surge tanks; sea-going qualities of vessels in rough sea; suction of interaction between passing vessels; critical speed and torsional vibration of shafts.

Gases. See FLOW OF GASES.

Pipes. The Pressure Drop in Smooth Pipes and the Coefficient of Flow of Standard Nozzles (Der Druckabfall in glatten Rohren und die Durchflussziffer von Normaldüsen), M. Jakob and S. Erk. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 581-584, 7 figs. Law of pressure drop of a flowing liquid in smooth pipe is tested within range of Reynolds values with water and air.

Steam. See FLOW OF STEAM.

Stream Lines. An Electrical Method for Tracing Stream Lines in the Two-Dimensional Motion of a Perfect Fluid, E. F. Relf. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 48, 284, Sept. 1924, pp. 535-539, 4 figs. Describes apparatus designed and constructed for use in Aerodynamics Dept. of Nat. Physical Laboratory, for plotting rapidly and accurately stream lines round an obstacle.

Theory. A New Theory of Fluid Flow, A. B. Cox. Franklin Inst.—Jl., vol. 196, no. 6, Dec. 1924, pp. 769-793, 12 figs. Examination of velocity-distribution curves accompanying this paper shows that whether rate of flow is above or below critical, elements of flow at different distances from center line of pipe have different forward velocities, and that these elements must be considered to "slide" or otherwise move relative to one another in this direction; author states there is a force by which molecules of various elements of flow are each enabled to affect speed of others; this phenomenon is cause of characteristic shape of curve of velocity-distribution, and upon it a mathematical proof of logarithmic form of curve can be based. Bibliography.

Viscous Fluids. Theory of the Movement of Fluids Between Journal and Bearing (Beitrag zur Theorie der Flüssigkeitsbewegung zwischen Zapfen und Lager), Geo. Duffing. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 4, Aug. 1924, pp. 296-314, 10 figs. Investigations of two-dimensional problem of viscous fluids; comparison of author's results with those of Reynolds theory.

FLOW OF GASES

Aeration of Jet of Gas. The Entrainment of Air by a Jet of Gas Issuing from a Small Orifice in a Thin Plate, J. S. G. Thomas. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 281, May 1924, pp. 1048-1056, 4 figs. It is shown that constant value of aeration of jet of gas issuing at different pressures from orifice, as referred to in Technologic Paper no. 193 (1921) of Bur. of Standards, characterizes induction flow system in which induction of air is effected under conditions such that flow of stream of air induced by jet is considerably reduced from its normal value in free air by restricting effective area of induction tube or otherwise.

Energy Conveyed by. The Energy Conveyed by a Flowing Gas and a Thermal Phenomenon Discovered by Martin Knudsen (Ueber die durch strömende Gase transportierte Energie und eine von Martin Knudsen entdeckte thermische Erscheinung), S. Weber. Zeit. für Physik, vol. 24, no. 5-6, June 12, 1924, pp. 267-284, 2 figs. Discusses investigations of Bohr on energy carried by diffusing particles or electrons; Knudsen's experiments in which hydrogen and atmospheric air were forced through tube containing long plug or glass wool, and in stationary state rise of temperature was observed at one end and fall at other end of plug; results are discussed in relation to theory; formula is obtained for total energy received by unit of area perpendicular to flow of gas.

Internal-Combustion Engines. See INTERNAL-COMBUSTION ENGINES, Flow of Gases in.

Measurement. Measuring Flow of Gases, Chas. P. Turner and B. W. Winship. Chem. & Met. Eng., vol. 30, no. 16, Apr. 21, 1924, pp. 633-635, 4 figs. Results of application of mixture method, suggested by salt-solution method for measuring flow of water, show that it is of value in related problems of fluid flow.

Pipes. Flow of Gas or Air in Pipes, Franklin H. Smith. Blast Furnace & Steel Plant, vol. 12, no. 10, Oct. 1924, pp. 448-449 and 451. By using formulas given, both high- and low-pressure flows may be estimated.

Pressure Reduction in Smooth Pipes and Coefficient of Flow for Standard Nozzles (Der Druckabfall in glatten Rohren und die Durchflussziffer von Normaldüsen), M. Jakob and S. Erk. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 267, 1924, 28 pp., 17 figs. Discusses determination of large quantities of flowing gases or liquids by measuring pressure drop in constriction (venturi tube, etc.), and gives results of experiments.

Theory. The Flow of Compressible Fluids, Treated Dimensionally, W. N. Bond. Physical Soc. Lond.—Proc., vol. 36, part 5, Aug. 15, 1924, pp. 367-378, 5 figs. Theoretical and experimental investigation of variation of pressure, density, temperature and velocity of a gas moving at speeds comparable with that of sound in gas.

FLOW OF LIQUIDS

Calculation. Experimental Determination of Flow Figures of Some Technical Liquids (Experimentelle Bestimmung der Ausflusszahlen einiger technischer Flüssigkeiten), P. Reschke. Zeit. für die gesamte Kälte-Industrie, vol. 31, no. 5, Jan.-June 1924, pp. 53-59, 6 figs. Results of experiments with solutions of magnesium chloride, gas oils and lubricating oils with orifices of 1, 5, 10 and 30 mm.

Cold Liquids. Viscosity and Resistance to Flow of Cold Liquids and Gases (Zähigkeit und Strömungswiderstand von kalten Flüssigkeiten und

Gasen), S. Erk. Zeit. für die gesamte Kälte-Industrie, vol. 31, no. 5, Jan.-June 1924, pp. 49-53, 5 figs. Effect of viscosity on pressure drop in pipe lines; viscosity of gases, liquefied gases, water and salt solutions.

Fluid Friction and Heat Transfer. Fluid Friction and Heat Transference, Thos. B. Morley. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 596-597, 2 figs. Points out that frictional resistance to flow of liquid in pipe and transference of heat between fluid and tube wall are interrelated, and both phenomena are materially influenced by viscosity of fluid; shows how labor of handling mathematical expressions may be obviated by use of nomographic chart.

Liquid Meters. The Bassler Liquid Meter. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 497-498, 4 figs. Instrument is guaranteed to give measurements with error of less than 0.1 per cent over temperature range of 150 deg. fahr., and irrespective of changes in viscosity of fluid or of pulsations and irregularities in rate of flow.

Pipes. See FLOW OF GASES, Pipes.

FLOW OF STEAM

Pipes. Critical Velocity of Steam and Condensate Mixtures in Horizontal, Vertical, and Inclined Pipes, F. C. Houghten and R. L. Lincoln, Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 153-168, 19 figs. Details of experiments made to obtain a thorough understanding and complete knowledge of factors entering into, and effects taking place when steam is sent through a pipe in which there is a counterflow of condensate. Effect of length and size of pipe and type of entrance, upon critical velocity.

Resistance of Pipe Bends to. How to Figure the Resistance of Pipe Bends to the Flow of Steam, C. H. Day. Heat. & Vent. Mag., vol. 21, no. 7, July 1924, pp. 51-52, 3 figs. Data on four assumed conditions, using standard ells, long-radius ells, minimum radius bends, and bends with radius of ten pipe diameters.

Supersaturation Losses. Losses Due to Supersaturation in the Efflux of Steam (Su le perdite per soprasaturazione nell'efflusso del vapore d'acqua), E. Foà. Industria, vol. 38, no. 9, May 15, 1924, pp. 245-250, 2 figs. Develops formulas for calculating losses and velocity from degree of undercooling of condensation, and variation of undercooling in successive expansion.

Velocity. Flow of Steam and Condensation as Affected by High Pressure, Horizontal Offsets and Valves, L. Ebin and R. L. Lincoln. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 6, June 1924, pp. 475-490, 9 figs. Deals with effect of high pressure on maximum velocity, valves on maximum capacity, and of horizontal offsets on maximum velocity.

FLOW OF WATER

Closed Conduits. Hydraulic Efficiency Tests on 43,000-h.p. Unit by the Gibson Method and the Allen Method, W. R. Way. Eng. Jl., vol. 7, no. 10, Oct. 1924, pp. 625-633, 9 figs. Tests carried on under operating conditions; Gibson method for measuring flow of water in closed conduits; test by salt-velocity method for measureemnt in large conduits, developed by Prof. Chas. M. Allen.

Control Apparatus. Modern Water Control Apparatus, F. J. Taylor. Can. Engr., vol. 47, nos. 13 and 14, Sept. 23 and 30, 1924, pp. 349-354 and 371-374, 14 figs. Notes on appliances for control and regulation of large volumes of water in connection with water power, river regulation and irrigation work. Ashford and Stoney sluices; Johnson valve.

Discharge Measurements. Discharge Measurements for the Control Section Weir, J. L. Savage. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, p. 842, 3 figs. Observations check closely theoretical rating curve; results of set of experiments made by Bur. Reclamation upon new type of measuring structure for which name "control section weir" has been proposed.

Groundwater. Geometrical Investigation of the Theory of Movement of Groundwater in Rubble and Water Filtration Through Sand (Geometrische Untersuchung der Theorie der Bewegung des Grundwassers im Gerölle und der Wasserfilterung durch Sand), L. Burmester. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 1, Feb. 1924, pp. 33-52, 28 figs. on supp. plate. Investigation of theory and its practical application.

How Does Groundwater Flow? (Wie fliesst das Grundwasser?), O. Emersleben. Bautechnik, vol. 2, no. 10, Mar. 7, 1924, pp. 73-76, 3 figs. Macroscopic investigation of flow in sand; the filter law; lowering of water level; total flow.

Measurement. Analytical Determination of Flow of Water (Die analytische Ermittlung der Pegelhöhenabflussmenge), A. Haiden. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 31-32, Aug. 8, 1924, pp. 280-281, 2 figs. Details of new method for determining flow of water in streams by means of a depth gage in a given time unit, obviating errors due to interpolation.

Automatic Water Measuring Device (Automatischer Wassermengenschreiber), J. Schenker. Schweizerische Bauzeitung, vol. 84, no. 17, Oct. 25, 1924, pp. 211-212, 5 figs. Particulars of a continuous recording water meter built by Stoppani & Co. on principle of a limnograph.

Calibrating Pitot Tubes [Eichung von Staurohren Pitotröhren)], R. Ehrenberg. Oesterreichische Monatsschrift für den Oeffentlichen Baudienst, vol. 5, no. 10, Oct. 1, 1924, pp. 134-137, 4 figs. Particulars of tests with four pitot tubes; calibration for free flow and for pressure piping; develops formulas for calculation.

Methods of Making Flow Tests and Their Value to Water Works Engineers, G. W. Booth. Am. Water Wks. Assn.—Jl., vol. 12, no. 2, Oct. 1924, pp. 157-167, 1 fig. See also Eng. & Contracting (Water Wks.), vol. 62, no. 5, Nov. 12, 1924, pp. 1079-1085, 1 fig. Method of making measurements of discharge of water from hydrants.

New Methods of Calculation in Hydraulics (Neuere Berechnungsmethoden aus dem Gebiete der Hydraulik), E. Meyer-Peter. Schweizerische Bauzeitung, vol. 84, nos. 1 and 2, July 5 and 12, 1924, pp. 1-5 and 15-18, 31 figs. Details of new formula for calculating velocity of flow, coefficient of roughness; artificial water conduit with free water level. Graphical method of determining hydraulic data for design of high-pressure plants.

The Salt Velocity Method of Water Measurement, Chas. M. Allen and Edwin A. Taylor. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 13-16 and 51, 7 figs. Describes new method and outlines its theory and development; apparatus and methods of computation used in laboratory and field tests; claims of method for high degree of accuracy and reliability.

See also WATER METER, Open-End Flume.

Open Channels. Calculation of the Flow of Water in a Channel (Bijdrage tot de berekening van den afvoer van zijdelingsche overlaten), O. J. Herz. Waterstaats-Ingenieur, vol. 12, no. 3, Mar. 1924, pp. 59-67, 3 figs. Theory and formulas for calculation of flow of water in a channel from changes of level produced by introduction of a barrier.

Investigation of the Formulas of Van Gauckler-Manning for the Determination of the Flow in Open Channels (Beschouwingen over de exponentieele formule van Gauckler-Manning voor de berekening van buisleidingen en open kanalen),

C. G. J. Vreedenburgh. Waterstaats-Ingenieur, vol. 12, no. 9, Sept. 1924, pp. 255-262, 5 figs. on supp. plates. Derivation of formulas is given and the various occurring coefficients and exponents are determined by test for certain conditions.

The Flow of Water in a By-Pass Channel Provided with Sectional Channels in Connection with Locks (Ueber die Wasserströmung in einem mit Stichkanälen versehenen Umlaufkanal bei Kammerschleusen), B. Schumacher. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 4, Aug. 1924, pp. 292-295, 6 figs. Determination of flow conditions at intersecting points of by-pass and branch channels; or flow in a channel with rectangular junction.

The Influence of Silt on the Velocity of Water Flowing in Open Channels. Indian Eng., vol. 75, nos. 15, 16, 17, 18, 19, and 20, Apr. 12, 19, 26, May 3, 10, and 17, 1924, pp. 206-208, 223-224, 234-235, 249, 262-263, and 276-278, 5 figs. Comments on paper written on this subject by A. B. Buckley, for 1923 Session of Instn. Civil Engrs. A. B. Buckley's theory; data of experimental observations at Baqlavis, Khannaq, and Beleida, all three on the Nile; Buckley-Wilson discharge recorder; account of discussions of paper.

Pipes. Determining Discharge Coefficients for Flow of Water in Short Pipes, O. W. Boston. Chem. & Met. Eng., vol. 30, no. 2, Jan. 14, 1924, pp. 56-59, 5 figs. Short method for determining loss of head for water flowing in pipes which may be readily applied in other cases of fluid flow.

The Flow of Water in Pipes and Channels, F. Heywood. Instn. Civ. Engrs.—Sessional Notices, no. 3, Feb. 1924, pp. 67-68. Attempt to coordinate available data relating to flow of water in conduits with entirely satisfactory results of tests on small-scale experimental pipe lines.

See also FLOW IN PIPES; FLOW OF FLUIDS, Pipes.

Return Lines. Determining Dry Return Proportions, R. V. Frost. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 5, May 1924, pp. 359-364, 2 figs. Analysis of factors governing flow of water and air in return lines, showing how they must be taken into account in properly proportioning dry-return capacities.

Rivers. Effect of Ice on Flow of Mississippi River at Keokuk, Iowa, A. Davis. Stone & Webster Jl., vol. 34, no. 4, Apr. 1924, pp. 475-480, 1 fig. Describes ice effect at Keokuk with idea that it may throw light on general problem of flow under ice cover in other locations.

Periodical Variations of the Water Flow in Rivers (De periodiske variasjoner i vasdragenes vandföringer), E. Kraaböl-Jörstad. Teknisk Ukeblad, vol. 71, no. 42, Nov. 7, 1924, pp. 361-364, 2 figs. Discusses statistical information on water flow and atmospheric precipitation for different rivers in Norway. Illustrates relations between water flow and precipitation, and relationship between variations of sun spots and precipitation.

Surface Water Supply of the United States 1919 and 1920, N. C. Grover, O. W. Hartwell, G. C. Stevens, W. E. Hall, W. R. King, and C. G. Paulsen. U. S. Geol. Survey, Water-Supply Paper no. 503, 1924, 254 pp. 5 figs. Records of gaging stations of river basins of Allegheny, Monongahela, Beaver, Tennessee, and others.

Sewer Pipe. See SEWERS, Flow of Water in.

Stream Flow. Stream Flow and Other Hydraulic Problems Solved by Model Experiments, Chas. I. Corp. Wis. Engr., vol. 29, no. 3, Dec. 1924, pp. 45-47, 7 figs. Examples of use of models for solving actual problems and methods for magnifying or transforming results from models to conditions of actual stream or structure.

Stream Gaging. Determination of Stream Flow Per Second in Rivers on the Basis of Surface-Velocity Measurements (Ermittlung der sekundlichen Abflussmengen in natürlichen Flussläufen auf Grund von Oberflächengeschwindigkeitsmessungen), M. Matakiewicz. Oesterreichische Monatsschift für den Oeffentlichen Baudienst, vol. 5, no. 7, July 1, 1924, pp. 98-99, 2 figs. Develops curves for vertical velocities; factor expressing relation between Kutter's coefficient of roughness and local profile head; relation of surface to profile velocity, etc.

Turbulent and Non-Turbulent. The Laws of Industrial Hydraulics (Sur les régimes hydrauliques industriels), C. Camichel and M. Ricaud. Technique Moderne, vol. 16, no. 5, Mar. 1, 1924, pp. 129-137, 30 figs. Author seeks to explain certain characteristics of hydraulic flow, showing existence of turbulent flow independent of form of obstacles; transition from one flow to another has its origin frequently in formation of surfaces of discontinuity; study of surfaces of discontinuity.

Velocity and Roughness Coefficients. Formula of Velocity and Coefficient of Roughness in Streams, Canals and Closed Conduits (Beiträge zur Frage der Geschwindigkeitsformel und der Rauhigkeitszahlen für Ströme, Kanäle und geschlossene Leitungen), A. Strickler. Schweizerische Bauzeitung, vol. 83, no. 24, June 14, 1924, pp. 265-268, 1 fig. Abstract of communication from Swiss Federal Water Supply Dept. Discusses formulation of equation of general validity for loss of energy in uniform turbulent flow.

FLUE-GAS ANALYSIS

Apparatus. Analyzing Combustion Gases in Industrial Furnaces (L'analyse des gaz de combustion dans les foyers industriels), E. Montrichard. Revue Générale de l'Electricité, vol. 16, no. 19, Nov. 8, 1924, pp. 743-748, 6 figs. Discusses flue-gas analysis, conditions and analysis apparatus must fill, and describes some apparatus, including Cambridge, Aci, Bacharach, Positif, etc.

CO Indicator. A New Instrument for the Continuous Indication of Carbon Monoxide in Boiler-Flue Gases, W. O. Andrews. S. African Instn. Engrs.—Jl., vol. 22, no. 10, May 1924, pp. 145-152, and (discussion) 152-153, 3 figs. Instrument devised by author as simple and inexpensive means of indicating, by means of color of liquid, presence or absence of small quantities of combustible carbon gases in flue gas.

CO Meters. Electrical Carbonic Oxide and Hydrogen Meters, E. Zopf. Eng. Progress, vol. 5, no. 5, May 1924, pp. 91-92, 6 figs. Electric apparatus for testing flue gases for their content of combustible components (especially carbonic oxide and hydrogen).

CO_2 Meters. Saving Coal by Control of Exhaust Gases in Boiler Firing (Kohlenersparnis durch Abgasüberwachung von Kesselfeuerungen), M. Moeller, K. Auer and M. U. Büchting. Wärme, vol. 47, nos. 19 and 21, May 9 and 23, 1924, pp. 212-214 and 240-242, 8 figs. Discusses flue-gas analysis, CO_2 meters with traveling grates, CO_2 and CO meters with hand firing; experiments with five tube boiler and hand firing.

CO_2 and CO Recorders. A New Measuring Instrument for the Registration of CO_2 and CO Based on Physical Principles (Ein neues Messgerät zur Registrierung von CO_2 und CO auf physikalischer Grundlage), R. Dunckel. Gas- u. Wasserfach, vol. 67, no. 15, Apr. 12, 1924, pp. 197-199, 3 figs. New double recorder for determination of CO together with CO_2 in flue gases.

CO_2 Recorders and Control Apparatus, J. B. C. Kershaw. Combustion, vol. 10, no. 3, Mar. 1924, pp. 202-205, 3 figs. Describes some new forms of CO_2 recorders and boiler control apparatus now being placed on market in Germany, Great Britain and United States.

Electrically Heated Platinum Tubes Used in CO_2 Recorder. Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 729-730, 1 fig. In new recorder made by Uehling Instrument Co., Paterson, N. J., novel scheme is employed to secure motive power for actuating recorder by burning combustible in electrically heated platinum tubes.

New Measuring Device for the Recording of CO_2 and CO Based on Physical Properties, R. Duenckel. Blast Furnace & Steel Plant, vol. 12, no. 9, Sept. 1924, pp. 422 and 426. Working principle is founded on difference in resistance to flow of a gas which exists in a capillary and an ordinary tube. Abstracted from Gas u. Wasserfach, Apr. 12, 1924, pp. 197-199.

Saving of Fuel in Marine Boilers by Flue-Gas Control (Ersparung von Brennstoff bei Schiffskesseln durch Heizgaskontrolle), Schulz. Brennstoff- u. Wärmewirtschaft, vol. 6, no. 12, Nov. 1924, pp. 239-242, 5 figs. Discusses Klagemann devices for recording feedwater, pressure, CO_2, CO, O, air pressure, smoke density, and fuel oil. Design and operation of Ranarex and Siemens & Halske apparatus.

The "Positif" CO_2 Recorder (Analyseur de CO_2 "positif"). Chaleur & Industrie, vol. 5, no. 48, Apr. 1924, pp. 195-197, 5 figs. Describes new and simple apparatus manufactured by Société Anonyme des Appareils de Manutention & Fours Stein, Paris.

Computations. Computations Involving Steam in Boiler Flue Gas, F. C. Evans. Combustion, vol. 10, no. 2, Feb. 1924, pp. 118-119. Discussion of method of finding loss due to moisture in coal and due to water from combustion of hydrogen; illustrated by alignment chart for use in solving equations for the purpose given in proposed Boiler Test Code of A. S. M. E.

Interpretation of. Interpretation of Flue Gas Analysis, F. D. Harger. Combustion, vol. 10, no. 2, Feb. 1924, pp. 115-117, 4 figs. Necessity of complete flue gas analysis as a guide to efficient combustion, end to be obtained being highest possible percentage of CO_2 without formation of CO and other combustible gases. Cautions to be observed in interpreting flue-gas analysis; losses caused by escape unburned of combustible gases and relation of loss to other loss factors.

Scientific Methods. Scientific Flue Gas Analysis, D. Brownlie. Eng. & Boiler House Rev., vol. 38, no. 1, July 1924, pp. 3-5, 2 figs. Gives essential facts regarding true scientific methods necessary for flue-gas analysis.

Testing Apparatus. Improved Method of Analyzing Flue Gases (Verbeterd rookgasonderzoek), S. De Waard. Ingenieur, vol. 39, no. 7, Feb. 16, 1924, 103-105, 2 figs. Describes improved device marketed by P. Beun, Amsterdam. Formulas.

Modern Flue Gas Testing Instruments. Eng. & Boiler House Rev., vol. 38, nos. 1, 3, 4, and 5, July, Sept., Oct., and Nov. 1924, pp. 12-13, 93-95, 155-156, and 209-210, 11 figs. Describes principal features of flue-gas testing instruments at present in use.

FLUE GASES

Temperature, Thermocouples for. See THERMOCOUPLES, Lagless.

FLUIDS

Equation of State. On a proposed Empirical Equation of State for Fluids, S. Lees. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 431-446, 1 fig. Author puts forward a new equation of state.

Flow of. See FLOW OF FLUIDS; FLOW OF WATER.

Measurement. See MEASURING INSTRUMENTS, Fluids.

Pressure Measurement. The Measurement of Pressure, J. L. Hodgson. Inst. Mar. Engrs.—Trans., vol. 36, Dec. 1924, pp. 487-522, and (discussion) 522-563, 51 figs. Methods of pressure measurement; fundamental and secondary methods; notes on use of fluid manometers; Bourdon gage; recording pulsating pressures. Bibliography.

FLUMES

Concrete. Concrete Flumes Solve Tunnel Drainage Problem, M. F. Clements. Ry. Age, vol. 77, no. 5, Aug. 2, 1924, pp. 189-191, 6 figs. Precast construction proves effective in overcoming difficulty from water in stampede tunnel, Washington.

Semi-Circular Wood. Semicircular Wood Flume with Radius of 6 Ft. Eng. News-Rec., vol. 92, no. 15, Apr. 10, 1924, pp. 612-613, 4 figs. Creosoted staves and section giving minimum leakage make for long life; crew assembles 500 ft. per day in renewal of flume along Deschutes River, Ore.

V-Section. Irrigation Flume of V-Section Supplies Oregon Project. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 9-10, 2 figs. Design of 352-ft. V-shaped flume for Silver Lake irrigation district, a recently constructed project in Lake County, Ore. Its advantages. Wedging system makes nails unnecessary to hold plank in place. Only standard sizes of lumber used.

FLUORSPAR

Mining. How Fluorspar Is Produced, E. C. Reeder. Du Pont Mag., vol. 18, no. 10, Oct. 1924, pp. 2-4, 4 figs. Notes on deposits and mining methods. Almost all domestic production comes from southern Illinois and western Kentucky.

U. S. A. Fluorspar and Cryolite in 1923, H. W. Davis. U. S. Geol. Survey, no. II:4, July 25, 1924, pp. 27-40. Statistics of production of fluorspar in U. S. A. and abroad.

FLUXMETERS

Study of. Theoretical and Experimental Study of the Fluxmeter, G. Darmois and G. Ribaud. Annales de Physique, vol. 1, series 10, Mar.-Apr. 1924, pp. 173-312. Theoretical treatment of modern form of Grassot fluxmeter, in which moving coil is supported on pivots instead of being suspended by cocoon silk fiber; deals also with its use for measurement of time intervals.

FLYING BOATS

Aeromarine. The Aeromarine Metal-Hull Flying Boat. Flight, vol. 15, no. 47, Nov. 22, 1923, pp. 711-713, 12 figs. Commercial biplane; passenger capacity for flights of 7 hr. duration, 5; for flights of 4 hr. duration or under, 7; span, upper wing, 65 ft.; lower wing, 48 ft. 6½ in.; length overall, 32 ft. 10 in.; chord, upper wing, 7 ft.; lower wing, 5 ft. 1 in.; area of upper wing with ailerons, 434 sq. ft.; lower wing, 218 sq. ft.; high speed (at 1700 r.p.m.), 98 m.p.h.; 400-hp. Liberty engine.

The Aeromarine Model EO Sport Flying Boat, B. V. Korvin-Kroukovsky. Aviation, vol. 17, no. 6, Aug. 11, 1924, pp. 858-860, 3 figs. Details of design and construction of three-seater fitted with six-cylinder 70- to 80-hp. Anzani type 6A3 engine, and tractor-type propeller.

All-Metal. See Aeromarine; Rohrbach; Short.

P.5. The "P.5" or Phoenix "Cork" Flying Boat. Flight, vol. 16, no. 11, Mar. 13, 1924, pp. 144-150, 16 figs. Complete description of P.5 flying boat, having two 360-hp. Rolls-Royce Eagle engines and following dimensions: length, 49 ft. 1¾ in.; span, 85 ft. 6 in.; ailerons, 81 sq. ft.; and notes on some other products of English Elec. Co., Ltd.

Rohrbach. A Rohrbach Flying-Boat. Aeroplane, vol. 26, no. 1, Jan. 2, 1924, pp. 18-19, 4

figs. Notes on all-duralumin monoplane of very similar construction to Staaken monoplanes; equipped with two Rolls-Royce Eagle IX type engines and designed to carry 12 persons; span, 95 ft. 3 in.; length, 54 ft. 2 in.

All-Metal Flying Boats for Britain. Flight, vol. 16, no. 29, July 17, 1924, pp. 449-451, 5 figs. Describes Rohrbach RO II, twin-engined flying boat of cantilever-monoplane type; maximum speed, 120 m.p.h.

The Rohrbach Flying Boat (Besuch bei der Rohrbach Metal Aeroplan Co. A/S Kopenhagen), G. Krupp. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 15-16, Aug. 26, 1924, pp. 165-167, 14 figs. Describes flying boat of large dimensions made entirely of duralumin at airplane factory founded by Rohrbach in Denmark; wing spread is 95 ft.; empty weight, 8359 lb.; boat has two motors carried above wings on struts; speed is 118 mi. per hr.; describes launching operation.

The Rohrbach RO II Twin-Engined Flying Boat. Aviation, vol. 17, no. 14, Oct. 6, 1924, pp. 1084-1085, 2 figs. Describes flying boat built to designs of Paul Rohrbach by Metal Aeroplan A. S. of Copenhagen, Denmark. Span, 95 ft. 8 in.; overall length, 54 ft. 6 in.; weight, empty, 8360 lb., and normal weight, loaded, 13,750 lb.

Shells. The Shells of Flying Boats (Les coques d'hydravions). Bul. Technique du Bureau Veritas, vol. 6, no. 5, May 1924, pp. 81-86, 15 figs. Discusses stresses in shells and floaters and experimental results; types of shells; review of developments during past 12 years.

Short. The Short All-Metal Light Flying Boat. Flight, vol. 16, no. 16, Apr. 17, 1924, pp. 220-223, 4 figs. Built entirely of metal, with exception of wing covering, and material mainly used in construction is duralumin; two 696 c.c. Blackburne engines; length, 24 ft. 8½ in.; span, 36 ft.

Tests. Experiments with Model Flying Boat Hulls. 24th Series Report; Comparison of Longitudinal with Transverse Steps, G. S. Baker and E. M. Keary. Aeronautical Research Committee, no. 893, Aug. 1923, 13 pp. 5 figs. Object of experiments was to test merits or demerits of form having longitudinal instead of transverse steps.

FLYWHEELS

Ammonia-Compressor. See AMMONIA COMPRESSORS, Flywheels.

Design. See INTERNAL-COMBUSTION ENGINES, Flywheel Design, Chart for..

Manufacture. Maxwell Methods in Flywheel Work, F. H. Colvin. Am. Mach., vol. 60, no. 20, May 15, 1924, pp. 729-730, 5 figs. Machine equipment, together with some of tooling fixtures and handling devices; drilling and tapping in multi-spindle machines; balancing machine.

Rolling-Mill Engines. Heavy Flywheels for Rolling-Mill Engines (Schwere Schwungräder für Walzenzugmaschinen), Luck. Maschinenbau, vol. 3, no. 15, May 8, 1924, pp. 525-526, 3 figs. See also Zeit. für die gesamte Giessereipraxis, vol. 45, no. 40, Oct. 5, 1924, pp. 315-316, 3 figs. Based on drawings, best forms and materials for heavy flywheels are discussed.

Stress Determination. The Stresses in a Uniformly Rotating Fly-Wheel, A. J. Sutton Pippard. Instn. Mech. Engrs.—Proc., no. 1, 1924, pp. 25-42, and (discussion) 43-51, 7 figs. Author uses method of analysis founded on certain theorems of Castigliano, which leads to formulas of straightforward and easily applied type; investigation dealing with stresses in ring subjected to system of radially applied forces is given in appendix.

FOGS. See GASES, Mists, Analysis of.

FOREMEN

Mine, Safety Bonus for. See BONUS SYSTEMS, Foremen.

Training. A Training Program for the Foreman, J. K. Novins. Railroad Herald, vol. 28, nos. 2 and 3, Jan. and Feb. 1924, pp. 25-30 and 26-30. Outlining study course; study plan proposed by Federal Board for Vocational Education; choosing text material for foreman conferences.

Some Psychological Aspects of Foremanship Training, F. Cushman. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 174-176. Responsibilities of foremen and methods of discharging them.

See also EMPLOYEES, TRAINING OF.

FORESTRY

Fire Statistics. Some Suggestions for Proposed Changes in the Methods of Collecting Forest Fire Statistics, P. W. Stickel. Jl. of Forestry, vol. 22, no. 3, Mar. 1924, pp. 266-274. Discusses importance of forest-fire statistics in relation to question of forest-fire insurance, and suggests some changes in method of collecting such statistics. Bibliography.

Forest Colonization. Forest Colonization in Sweden, H. I. Baldwin. Jl. of Forestry, vol: 22, no. 3, Mar. 1924, pp. 241-257. Character of forest; climate. Primary object of colonization has been development of a settled population of forest workers. Relation between population and intensity of forestry; previous efforts at colonization in state forests; present grants for colonization; general extent and results of colonization. References.

India. Some Results of Research Work in Indian Forestry. Chem. Age (Lond.), vol. 11, no. 278, Oct. 11, 1924, pp. 368-369. Account of research work on Indian timbers, and industrial advantages arising from their successful chemical treatment for various purposes.

North America. The Forests and Timber Supply of North America, R. L. Robinson. Roy. Soc. Arts—Jl., vol. 72, no. 3726, Apr. 18, 1924, pp. 360-361, and (discussion) 367-370. Importance of North American forests; brief survey of main forest regions; trade in timber and primary wood products; forest exploitation; etc.

Reforestation. Reforestation and Timber Conservation, J. W. Blodgett. Mech. Eng., vol. 46. no. 2, Feb. 1924, pp. 59-63 and 72, 7 figs. Nation wide reforestation policy a necessity; regrowth of timber for pulpwood and low-grade material; regrowth of timber suitable for lumber; points out that reforestation for lumber purposes is task for Federal Government; benefits to be derived from Federal reforestation of logged-off lands.

Relation to Floods. The Relation of Forests to Destructive Waters in the Light of Scientific Investigations, D. Y. Lin. Assn. Chinese & Am. Engrs.—Jl., vol. 4, no. 10, Dec. 1923, pp. 1-7, 4 figs. Discusses flood problem from a forestry standpoint. Influence of forests on watersheds, and condition they create with regard to surface run-off, soil erosion, absorptive capacity of soil cover, underground seepage, and stream flow.

Research. Use of Statistical Methods in Forest Research, J. Kittredge, Jr. Jl. of Forestry, vol. 22, no. 3, Mar. 1924, pp. 306-314. Author outlines what seems to him to be most promising statistical methods for use in forest research and gives examples of kinds of problems in which their application might prove useful. References.

United States. The Evolution of Forest Industries in the United States, W. B. Creeley. West. Soc. Engrs.—Jl., vol. 29, no. 1, Jan. 1924, pp. 1-12. Notes on expanding scale of lumber opera-

tions and of timber use; relations of forest industries to timberland; utilization of raw material; transportation costs and lumber prices; situation of paper industry; transportation costs and reforestation; a national forestry policy.

FORGE SHOPS

Germany. Forge Shop of the German Waffen- und Munitionsfabriken, Wittenau near Berlin (Hammerschmiede der Deutschen Waffen- und Munitionsfabriken in Wittenau bei Berlin), O. Leitholf. Praktische Maschinen-Konstrukteur, vol. 57, no. 18, May 20, 1924, pp. 248-250, 8 figs. Design and construction of shop 162 m. long and 30 m. wide for forges and presses.

Time Study in. See TIME STUDY, Forge Shops.

FORGING

Car Buffers. See CARS, Construction Methods.

Coining-Press. See PRESSES, Coining, Forging in.

Collared Shafts. Calculations in Forging a Collared Shaft, C. J. Steen. Forging—Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 40-42, 10 figs. Method of calculating size of ingot and forging time; size of press and unit of forging pressure important factors.

Crankshafts, Automobile. See CRANKSHAFTS, Forging.

Drop Forging. See DROP FORGING.

Equipment for. The Modern Forging and Stamping of Steel. Metal Industry (Lond.), vol. 24, nos. 25 and 26, and vol. 25, no. 1, June 20, 27 and July 4, 1924, pp. 605-606, 627-628 and 9-11. Survey of forging and stamping work, from questions of shop equipment and layout to causes of defective stampings and heat treatment considerations.

Hammers. See HAMMERS.

Lids for High Pressures. Manufacture of Forged Lids for High-Pressure Containers (Herstellung geschmiedeter Druckteller), P. Patek. Praktische Maschinen-Konstrukteur, vol. 57, no. 11, Apr. 1, 1924, pp. 146-148, 4 figs. Describes the various stages in formation by means of forging presses, of a forged lid, or cover, such as for closing a cylindrical oil-filled container.

Safety Code for. Safety Code for Forging. Nat. Safety News, vol. 9, no. 6, June 1924, pp. 56-61, 23 figs. Also Forging-Stamping—Heat Treating, vol. 10, no. 8, Aug. 1924, pp. 282-285. Tentative draft formulated under general auspices of Am. Eng. Standards Committee to provide reasonable safety for life, limb, and health. Applies to all power forging hammers and incidental operations in connection therewith, including hot saws.

Swaging. See SWAGING.

FORGINGS

Heavy. The Production of Heavy Forgings. Mech. Eng., vol. 46, no. 5, May 1924, pp. 241-247 and 307, 15 figs. Survey of status of industry in America at present time, together with data helpful to engineer ordering forgings.

Locomotive. See LOCOMOTIVES, Tires and Forgings, Manufacture.

Shock Detection during Treatment. The Clink Detector for Steel Ingots and Forgings. Engineering, vol. 118, no. 3071, Nov. 7, 1924, p. 658, 6 figs. Instrument, when attached to forging during heating and cooling processes, gives autographic record of any shocks or disturbances which may have taken place.

Steel. Recent Developments in Steel Forgings, J. L. Cox. Forging—Stamping—Heat Treating, vol. 10, nos. 1 and 2, Jan. and Feb. 1924, pp. 12-16 and 87-89, 23 figs. Review of developments in line of forging exceptionally large machine parts; forgings often employed to advantage in place of steel castings.

Steel, Brittleness of. Brittleness of Steel Due to Tempering After Being Forged Cold (Om anlöpningssprödhet), G. Wazau. Jernkontorets Annaler, no. 7, 1924, pp. 343-360, 19 figs. Examples where steel parts, which have been drawn after having been worked in cold condition, have become very brittle, and investigation of such breaks by means of etching of sections according to Fry's method.

Steel, Testing of. Proposed Definitions and Specifications for Tests of Iron and Steel Forgings and Steel Castings [Förslag till begreppsbestämningar (nomenklatur) vid provning av metallers draghållfasthet m. m.], J. O. Roos. Jernkontorets Annaler, no. 8, 1924, pp. 404-450, 2 figs. Communication from Government Testing Inst. Gives nomenclature referring to tensile-strength measurements of steel and iron in Swedish, English, French, and German, also test specifications of several countries.

Testing Large. How English Test Big Forgings. Iron Trade Rev., vol. 74, no. 24, June 12, 1924, pp. 1557-1558, 4 figs. Stresses encountered by turbine rotors and other large forgings have led British steelmakers to examine core by means of special optical instrument; defects usually develop along axis.

FOUNDATIONS

Bearing Soils. Resistance Capacity of Bearing Soil and Influence of Cohesion in Earth Pressure and Earth Resistance (Die Widerstandsfähigkeit des Untergrundes und der Einfluss der Kohäsion beim Erddruck und Erdwiderstande), H. Krey. Bautechnik, vol. 2, no. 40, Sept. 16, 1924, pp. 462-474, 19 figs. Calculation of foundation pressure; examination of bearing soil on assumption of plane, circular, and curvilinear sliding surfaces; influence of cohesion; mathematical treatment of cohesion; absence of friction; etc.

Building. Stresses Due to a Loaded Surface When Earth Is Treated as an Elastic Solid, S. D. Carothers. Engineering, vol. 118, nos. 3053 and 3057, July 4 and Aug. 1, 1924, pp. 1-2 and 156-159, 7 figs. Treating earth as elastic solid as means of obtaining stresses in earth foundations; stresses in foundations due to weight of earth and to load on surface.

Caissons. See CAISSONS.

Cofferdams. See COFFERDAMS.

Concrete-Mattress. Using Concrete Mattresses for Foundations. Ry. Age, vol. 77, no. 6, Aug. 9, 1924, pp. 229-233, 11 figs. Pennsylvania adopts this type of construction at new Sharpsburg Engine Terminal near Pittsburgh.

Concrete Piles for. See PILES, Concrete.

Developments. Foundation Development During Fifty Years, D. E. Moran. Eng. News-Rec., vol. 92, no. 16, Apr. 17, 1924, pp. 670-673, 3 figs. Review of developments in foundations for bridges and buildings.

Engine. Engine Foundations in Power Plants, J. D. Wilder. Oil Engine Power, vol. 2, no. 12, Dec. 1924, pp. 629-632, 4 figs. Points out that properly designed base will eliminate any movements of engine and base upon supporting soil or other support; for this work monolithic concrete has been found best; gives table of soil-bearing powers used in computing areas of machinery bases.

Gas-Engine. See GAS ENGINES, Foundations.

Gas Holders. See GAS HOLDERS, Foundations.

Groundwater Level Lowering. Lowering Groundwater Level for Rebuilding the Zurich Cantonal Bank (Die Grundwasserabsenkung beim Neubau der Zürcher Kantonalbank). Schweizerische Bauzeitung, vol. 84, no. 13, Sept. 27, 1924, pp. 152-156, 7 figs. Discusses Siemens-Bauunion system of lowering groundwater level and its application in extension of Bank building.

Machinery. See MACHINERY, Foundations.

Office-Building. See CONCRETE CONSTRUCTION, REINFORCED, Office; Building Substructures.

Piers. See PIERS.

Reinforcement against Mining Subsidence. The Reinforcement of Buildings and Their Foundations against Mining Subsidence, Jos. Eltringham. North of England Inst. Min. & Mech. Engrs. —Trans., vol. 74, part 2, Jan. 1924, pp. 22-33, 11 figs. Methods of arresting subsidence and preventing damage; examples giving result of reinforced-concrete foundations. See also (discussion) in part 3, Mar. 1924, pp. 42-50, 6 figs.

Removing. See BLASTING, Concrete Foundations.

Sinking in Water-Bearing Material. Small Open Caissons Used in Water-Bearing Material. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 826-827, 2 figs. Method used in sinking foundations of small apartment house in Boston, which involves modifications of method used for First National Bank building of Boston; two types of caissons used; level of water table lowered by pumping; diver used to excavate sumps.

Steam-Turbine. See STEAM TURBINES, Foundations.

Stresses in Rectangular Block. An Extension of the Middle Third Theory, A. C. Vivian. Engineering, vol. 118, no. 3075, Dec. 5, 1924, pp. 763-764, 4 figs. Author seeks to elaborate general equation which, it is claimed, provides easy and safe approximation to actual stresses existing under base of eccentrically loaded rigid rectangular foundation block.

Test Loads. Foundation Test Loads as Affected by Scale, S. D. Carothers. Can. Engr., vol. 47, no. 17, Oct. 21, 1924, pp. 439-442. The narrower the strip, the greater the unit resistance if the stress on horizontal planes is greater than on vertical planes; all widths of strip may give same unit resistance; relation if ground is invariable. From paper presented before Eng. Sec., Int. Mathematical Congress, Toronto.

Tests. See TERMINALS, RAILWAY, Freight.

Timber-Pile. Building a Pile Foundation for a Marsh-Land Factory, R. L. Hart. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 208-210, 6 figs. Heavy concrete mats and pedestals carried by 200,000 timber piles sunk 10 to 50 ft. through bog to sand-clay bottom of Jersey meadows near Newark for telephone manufacturing plant of West. Elec. Co.

Underpinning. Underpinning Printing Plant for New Deep Foundations. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 982-985, 6 figs. Large newspaper presses carried by jacks and blocking while wells for concrete piers are sunk 120 ft. through clay to rock, in supporting building which contains printing plant of Chicago Tribune.

FOUNDRIES

Alignment Charts for Use in. See ALIGNMENT CHARTS, Foundry.

American Decrease. Decrease in Foundries Noted. Foundry, vol. 52, no. 20, Oct. 15, 1924, pp. 801-805, 7 figs. Statistics indicate less number of castings plants in operation in 1924 than in 1922.

American vs. European Practice. American Versus European Foundry Practice, H. M. Lane. Iron Age, vol. 113, no. 11, Mar. 13, 1924, pp. 803-804. Comparison based on relative social and economic conditions; light building construction; machine-tool design.

European and American Foundries Compared, H. M. Lane. Foundry Trade Jl., vol. 30, no. 422, Sept. 18, 1924, p. 245. Extract from paper presented to South. Metal Trades Assn.

Apprentices for Training. See APPRENTICES, TRAINING OF, Foundry.

Automobile Castings. Keeping Pace with Auto Output. Foundry, vol. 52, no. 18, Sept. 15, 1924, pp. 718-725, 13 figs. Principal changes that have taken place in plant of Wilson Foundry & Machine Co., Pontiac, Mich., one of the largest foundry plants in world devoted exclusively to production of castings for automobile engines, indicating rapidity of its growth.

The Foundry of the Sunbeam Motor Car Company. Foundry Trade Jl., vol. 29, no. 407, June 5, 1924, pp. 455-459, 11 figs. Particulars of equipment and methods employed.

See also Ford Motor Co.

Brass. See BRASS FOUNDRIES.

Building Design. Study of Foundry Building Design. Iron Age, vol. 114, no. 21, Nov. 20, 1924, pp. 1334-1337, 6 figs. Influence of site selection, building layout, material storage, and methods of operation on better foundry practice.

Car-Wheel. Car Wheel Foundry with Parallel Motions. Iron Age, vol. 114, no. 2, July 10, 1924, pp. 67-70, 6 figs. Describes equipment of Rochester, N. Y., works of Nat. Car Wheel Co. Molding unit for manufacture of chilled-iron car wheels having capacity of 400 wheels in 8 hr. recently placed in operation. Six straight-line conveyors to handle molds, drags, copes and chills, and sand. Continuous molding operations.

Make Wheels and Brakeshoes, P. Dwyer. Foundry, vol. 52, no. 18, Sept. 15, 1924, pp. 707-712, 12 figs. Describes plant of Canada Iron Foundries, Ltd., manufacturing cast-iron chilled wheels for railway cars, brakeshoes, and miscellaneous castings, principally municipal work and pipe fittings. Two foundries draw supplies from same stockyard and are served by metal from a battery of four cupolas charged from a common platform.

Coke for. See COKE, Foundry.

Cost Accounting. A Foundry Cost System. Foundry Trade Jl., vol. 30, no. 417, Aug. 14, 1924, pp. 157-160. Outlines foundry cost accounting system arranged primarily for iron foundries producing castings of varied designs and of wide range in weight, but underlying principles upon which it is based can be rendered applicable to brass, malleable and steel foundries by changing terminology and altering arrangement of cost details to suit conditions prevailing therein.

A System of Foundry Organisation and Cost Recording, M. Nicholls. Foundry Trade Jl., vol. 30, no. 426, Oct. 16, 1924, pp. 324-325. Details of successful organization; examples of forms used.

Cost Finding in a Foundry, W. J. Corbett. Am. Foundrymen's Assn., preprint no. 410, for meeting Oct. 11-16, 1924, 36 pp., 6 figs. Discusses factors justifying a manufacturer in operating a foundry and uses of an effective cost system. Explains necessity for foundry industry to adopt uniform cost finding methods, and shows the great variations in ascertaining casting costs by comparing figures based on methods used in some 80 steel foundries. Outlines a general cost accounting system for a foundry with reference in a general way to main elements of foundry

costs, and describes in detail a job cost system which furnishes necessary data that should be supplied by a good foundry cost system.

Departmental Costs in the Foundry, H. B. May. Am. Foundrymen's Assn., preprint no. 415, for meeting Oct. 11-16, 1924, 13 pp. Also Foundry Trade Jl., vol. 30, 426, Oct. 1924, pp. 333-335. Engineering or departmental costs show profit or loss of each unit, whether unit be job, contract, line of product or operating department. Advocates careful analysis of each department to determine correct basis on which to distribute burden. Discusses departments of a foundry to clarify this idea and to show divisions of foundry costs.

Describes Foundry Cost Plan, Thos. Perkins. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 303-306, 2 figs. Methods employed in obtaining cost of production based on expenditures covering raw materials, melting and molding.

Distribute Costs on Each Job, E. C. Boehringer. Foundry, vol. 52, no. 6, Mar. 15, 1924, pp. 207-212, 11 figs. Nugent Steel Castings Co., Chicago, manufacturers of electric-steel castings, make detailed tabulation of expenses including minor materials to each job; how work is routed through shop.

Finds Costs by Uniform Method, R. E. Belt. Iron Trade Rev., vol. 75, no. 10, Sept. 4, 1924, pp. 604-606. Benefits derived from uniformity of methods for determining production costs are shown by bids received on malleable castings before and after system was adopted. Some bids found to be below cost.

German Method of Costing in Foundries. Foundry Trade Jl., vol. 30, no. 430, Nov. 13, 1924, pp. 410-411. Principles of costing in iron foundries; proposes standard basis for arriving at cost of castings. Abstract of monograph issued by German Union of Iron Foundries (Verein deutscher Eisengiessereien).

Why Foundry Costs Vary on Rough Castings, A. Luenberg. Can. Foundryman, vol. 15, no. 3, Mar. 1924, pp. 14-15, 3 figs. Uniform cost-finding method for foundries; individual cost of castings based on actual time prevents confusion in locating leaks.

See also Overhead Charges; Steel, Cost System for.

Cupolas. See CUPOLAS.

Decentralized Control. Organization for Better Foundry Practice. Iron Age, vol. 114, no. 24, Dec. 11, 1924, pp. 1552-1554, 2 figs. One man vs. decentralized control; analysis of business before changing to decentralized control; successful one-man operation and its limitations.

Electric-Furnace Melting. See ELECTRIC FURNACES, Low-Grade Iron and Scrap; Melting.

Electrically Equipped. A Completely Electrified Foundry, E. J. Cipperly. Elec. Wld., vol. 84, no. 11, Sept. 13, 1924, pp. 515-517, 5 figs. Describes plant of Alloy Steel & Metals Co., Los Angeles, Cal., which has been in successful operation for more than a year. Melting, core baking, heat treating, and welding all performed electrically.

Electricity in the Foundry. Elec. Times, vol. 66, no. 1719, Sept. 25, 1924, pp. 360-362, 7 figs. Deals with principal features of interest in new electrically equipped foundry of Laurence, Scott & Co., Norwich.

Equipment. See FOUNDRIES, Equipment.

European Practice. Some Further Reflections on Continental Foundry Methods, A. S. Beech. Foundry Trade Jl., vol. 30, nos. 435 and 436, Dec. 18 and 25, 1924, pp. 515-518 and 537-541, 19 figs. Notes on pattern drawing; double-faced pattern plates; ramming of sands; refers also to what is known in France as "rehausse inferieure," and in Great Britain as down-sand frames; sand considerations and comparisons; sand preparation, milling and disintegrating.

Ford Motor Co., Detroit. Jobbing Foundry of Ford Motor Co., F. L. Prentiss. Iron Age, vol. 113, no. 21, May 22, 1924, pp. 1485-1489, 8 figs. Iron, steel, and non-ferrous departments; blast furnace, cupola, and electrically melted metals used; new steel plant.

General Expenses, Allocation of. The Allocation of General Expenses. Foundry Trade Jl., vol. 30, no. 434, Dec. 11, 1924, p. 504. Belgian Commission appointed to consider manufacturing costs has recommended that overhead expenses should be divided into sectional costs and general expenses, common to all orders, or general cost of administration. Translation of report presented by Belgian Foundrymen's Assn. to Congress of Assn. Technique to Founderie.

Gray-Iron. Foundry Designed for Heaviest Work, F. L. Prentiss. Iron Age, vol. 113, no. 19, May 1, 1924, pp. 1274-1277, 5 figs. Adaptable to light and jobbing work as well; unusually large electric core ovens and pattern-storage facilities.

Studebaker Gray Iron Foundry Largest, G. L. Lacher. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 835-842, 11 figs. Describes foundry just completed by Studebaker Corpn., South Bend, Ind., largest unit foundry in country, measuring 683 ft. by 722 ft., covering 11 acres of ground space, and embracing over 13 acres of floor area. Raw material storage bay entirely covered and inclosed; special sand storage and handling features; provisions for illumination, heating, and ventilation noteworthy.

Tunnels Facilitate Handling of Material in New Foundry, P. Dwyer. Iron Trade Rev., vol. 75, no. 14, Oct. 2, 1924, pp. 879-883 and 897, 11 figs. Also Foundry, vol. 52, no. 20, Oct. 15, 1924, pp. 806-812, 10 figs. Description of new foundry of Studebaker Corpn., at South Bend, Ind., and notes on methods employed. Designed and equipped for a potential melting capacity of 400 tons of gray-iron castings per day.

Hardness Testing in. See HARDNESS, Brinell Ball Testing Method.

Heating. Eliminating Costly Heating in the Foundry, A. L. Green. Can. Foundryman, vol. 15, no. 12, Dec. 1924, pp. 20-21. Advantages of unit-heater installations.

Heavy Machine Parts. Make Heavy Machine Parts, P. Dwyer. Foundry, vol. 52, nos. 5 and 6, Mar. 1 and 15, 1924, pp. 179-184 and 199, and 221-225 and 229, 13 figs. Methods, appliances, floor space and mechanical equipment on huge scale at Farrel Foundry & Machine Co., Ansonia, Conn., required to handle castings for sugar mills, rubber factories, and paper mills.

Ingot Molds. Develop Ingot Mold Foundry, Pat Dwyer. Foundry, vol. 52, no. 4, Feb. 15, 1924, pp. 125-130, 9 figs. Practice at foundry of Vulcan Mold & Iron Co., Latrobe, Pa.; in addition to solid molds made in dry sand and poured vertically, split molds are made in halves in green sand and poured horizontally.

International Coöperation among Foundrymen. A World Outlook for American Foundrymen, H. Cole Estep. Am. Foundrymen's Assn.—preprint no. 413, for meeting Oct. 11-16, 1924, 18 pp., 15 figs. Traces growth and effects of international movement among foundrymen since war; influence of European foundry practice on America and that of American practice on Europe.

Iron. Essentials in Calculations for Iron Foundries (Die Grundzüge der Kalkulation in der Eisengiesserei), J. Schumacher. Giesserei-Zeitung, vol. 21, no. 20, Oct. 15, 1924, pp. 437-441. Discusses cost of remelting and yield of melts, and gives various examples of calculation.

Practical Heat Economics in the Iron Foundry (Praktische Wärmewirtschaft in der Eisengiesserei), Archiv für Wärmewirtschaft, vol. 5, no. 11, Nov. 1924, pp. 212-214, 8 figs. Discusses measuring apparatus, Schürmann furnace using cupola-furnace waste gas for preheating air for blowers, forced-draft firing for drying chamber, etc.

Science in the Iron Foundry, G. S. Bell. Metal Industry (Lond.), vol. 25, no. 26, Dec. 26, 1924, pp. 615-616 and 618 and vol. 26, no. 1, Jan. 2, 1925, pp. 12-13. Practical value of scientific method; interdependence of physics and chemistry and their practical importance; analysis and fracture of pig iron; influence of chemical constituents of cast iron; molding sands; melting practice. (Abstract.) Paper before Lincoln Eng. Soc.

Labor-Saving in. Mechanical Foundry Minimizes Labor, J. E. McDonald. Iron Age, vol. 113, no. 9, Feb. 28, 1924, pp. 633-637, 9 figs. Output per man trebled in new plant of Lavelle Foundry Co., Anderson, Ind., features of which are three stories, gravity flow, controlled conveyors and specialized design. See also description by D. M. Avey in Iron Trade Rev., vol. 74, no. 9, Feb. 28, 1924, pp. 601-606, 10 figs.; and Foundry, vol. 52, no. 5, Mar. 1, 1924, pp. 167-174, 16 figs.

Lighting. See LIGHTING, Foundries.

Locomotive, Costs in. Locomotive Foundry Costs, G. Norman. Ry. Engr., vol. 45, no. 531, Apr. 1924, pp. 138-140, 6 figs. Methods of calculating costs of castings.

London, England. A New London Foundry. Foundry Trade Jl., vol. 30, no. 415, July 31, 1924, pp. 92-97, 9 figs. Describes foundry which has recently been started up at North Woolwich Works of Harland & Wolff, Ltd., laid down expressly to meet requirements of extensive ship-repairing and engineering shops which have recently been erected and equipment of which is now completed.

Malleable-Iron. From Blast Furnace to Malleable Casting, G. L. Lacher. Iron Age, vol. 113, no. 13, Mar. 27, 1924, pp. 921-926, 7 figs. Description of plant of Cadillac Malleable Iron Co., motor-car builder, at Cadillac, Mich.; foundry adjoins charcoal furnace; suspended molding machines, annealing ovens, and buggies for material handling are features.

Iron Supply Governs Location. Foundry, vol. 52, no. 10, May 15, 1924, pp. 389-395, 11 methods. Methods and equipment of Cadillac Malleable Iron Co., Cadillac, Mich., which chose site near source of charcoal-iron production; interplant transportation features, ladles, etc.

Make Malleable on Pacific Coast. Iron Trade Rev., vol. 75, no. 21, Nov. 20, 1924, pp. 1375 1380, 8 figs. Describes new plant of Pac. Malleable Castings Co., at Oakland, Cal., and its notable changes from customary practice; one building houses all departments; practically all handling is done with crane and magnet.

Operates New Malleable Foundry, E. C. Boehringer. Iron Trade Rev., vol. 75, no. 1, July 3, 1924, pp. 29-33, 6 figs. See also Foundry, vol. 52, no. 13, July 1, 1924, pp. 521-526 and 533, 13 figs. Describes plant, including equipment, and practice of Belle City Malleable Iron Co., Racine, Wis.

Pours Iron on Second Floor, E. C. Boehringer. Foundry, vol. 52, no. 12, June 15, 1924, pp. 455-459, 13 figs. Layout and construction of foundry of Tri-Cities Malleable Castings Co., East Moline, Ill.; molds are made and all iron required is melted, poured, and shaken out on upper floor; castings are cleaned and shipped on lower floor.

Reconstructing Plant Under Production, G. L. Lacher. Iron Age, vol. 114, no. 1, July 3, 1924, pp. 5-9, 6 figs. Pulverized-coal air furnaces with water system for disintegrating slag, continuous annealing oven and molding-floor arrangement are features of plant of Belle City Malleable Iron Co., Racine, Wis.

Materials Handling. Improve Shop Transportation, H. R. Simonds. Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 920-923, 8 figs. Substitution of concrete runways, simplification of department arrangement and adaptation of regularly scheduled tractor trains at Walworth Mfg. Co.'s shop.

Savings from Conveyor and Molding Equipment, Robt. T. Kent. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 209-214, 7 figs. How foundry management has cut cost and increased output.

Organization. See INDUSTRIAL ORGANIZATION, Foundry Finishing Department.

Overhead Charges, Allocation of. Space-Factor Rate v. Hour Rate in the Allocation of Overhead Charges. Foundry Trade Jl., vol. 30, no. 427, Oct. 23, 1924, pp. 661-663. Suggestions for correct allocation of overhead charges.

Patterns. See PATTERNS.

Power-Gas Consumption Measurement. The Measurement of Power Gas, F. J. Taylor. Foundry Trade Jl., vol. 29, no. 390, Feb. 7, 1924, pp. 105-109, 9 figs. Measurement of amount of gas used for motive power in foundries. Discusses determination of volume passing through gas main by: (1) Estimation in case of engines, (2) pitot tubes, (3) orifices, (4) venturi tubes, and (5) electro-flow meters.

Practice. See IRON FOUNDING.

Pulverized-Coal-Burning. Adopt Powdered Coal System. Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 667-670, 6 figs. Experience of malleable-iron foundry of Am. Radiator Co., Buffalo, N. Y., with powdered-coal burning for melting and annealing castings. Advantages claimed as result include neatness and economy and a considerable reduction in cost.

Repair-Ship. See SHIPS, Repair, Foundry Equipment of.

Sand Blasting. Sand Blasting Essential Unit in Modern Foundry. Can. Foundrymen, vol. 15, no. 5, May 1924, pp. 14-17, 7 figs. Abrasive forced against casting will remove burned sand effectively. Sand and steel abrasives to suit every class of work done by special or general-purpose machine.

Sand, Molding. See SAND, MOLDING.

Ship. Foundries on Our Men of War, A. M. Charlton. Foundry, vol. 52, no. 15, Aug. 1, 1924, pp. 584-588, 5 figs. Also Iron Trade Rev., vol. 75, no. 7, Aug. 14, 1924, pp. 416-420, 5 figs. Severe demands placed on battleships in time of war together with long periods ships remain away from home ports necessitate complete foundry and machine-shop equipment aboard.

Soil-Pipe. Remodel Soil Pipe Foundry to Speed Production. Can. Foundryman, vol. 15, no. 8, Aug. 1924, pp. 11-13, 21 and 26, 5 figs. Toronto Hardware Mfg. Co. operate well equipped plant developed from small beginning; transportation facilitated by overhead trolley nearly mile in length; discusses uses of soil pipe, history of plant, making cores and oil and tar.

Steel. Steel Foundry Practice at Schenectady, L. S. Love. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 815-819, 11 figs. Some methods at steel foundry at Schenectady Works of Gen. Elec. Co. Segment patterns and core work extensively used. Chipping and machining lessened by reduction of risers and webs.

See also IRON AND STEEL, Italian Industry.

Steel, Cost System for. Distributing Costs on Each Job, E. H. Boehringer. Iron Trade Rev.,

vol. 74, no. 13, Mar. 27, 1924, pp. 853-857, 12 figs. Describes elaborate, yet not burdensome, cost system developed by Nugent Steel Castings Co., Chicago, Ill., whereby it keeps before it at all times a running and complete picture of all its cost factors; is controlling factor through plant from unloading of steel scrap to shipment of finished casting.

Time Study in. See TIME STUDY, Foundries.

Ventilation. See VENTILATION, Foundries.

FOUNDRY EQUIPMENT

Birmingham Exhibition, England. The International Foundry Trades' Exhibition. Foundry Trade Jl., vol. 29, nos. 409 and 410, June 19 and 26, 1924, pp. 502-508, 525-526, 528 and 530; and 557-542; 24 figs. See also Metal Industry (Lond.), vol. 24, nos. 25 and 26, June 20 and 27, 1924, pp. 599-604 and 622-626, 24 figs. Brief descriptions of exhibits at show at Birmingham, Eng., which cover general foundry plant, foundry requisites, patterns and pattern-making machinery and tools, molding sands, refractories, die-casting plant and laboratory equipment, raw materials, fuel and finished castings of all kinds.

Core and Sand Testing Equipment. Molds, Cores and Molding Sands (Ueber Formen, Kerne und Formsande), L. Treuheit. Giesserei-Zeitung, vol. 20, no. 25, Dec. 1, 1923, pp. 483-492, 30 figs. Strength-testing apparatus for molds and cores; a new decanting apparatus for molding sands; evaluation of molding sands.

Core Boxes. See CORE BOXES.

Exposition. The International Foundry Trades Exhibition at Birmingham. Engineering, vol. 117, no. 3052, June 27, 1924, pp. 824-825, 3 figs. Exhibition at Birmingham, Great Britain, covering entire range of foundry work, especially molding machines, several of which are illustrated and described.

Flasks. Notes on Moulding Boxes, G. Hoffmann. Foundry Trade Jl., vol. 29, no. 391, Feb. 14, 1924, pp. 129-131, 19 figs. Requirements and design of flasks; design of bars; wrought-iron flasks. Translated from Die Giesserei.

Ladles. See LADLES.

Metallurgical Control in. Metallurgical Control in the Iron Foundry, J. A. Holden. Foundry Trade Jl., vol. 30, no. 420, Sept. 4, 1924, pp. 207-208. Deals separately with controlling light and heavy castings.

Milwaukee Exhibition. Innovations Feature Milwaukee Show. Foundry, vol. 52, no. 21, Nov. 1, 1924, pp. 846-852, 14 figs. See also Iron Age, vol. 114, no. 17, Oct. 23, 1924, pp. 1063-1064 and 1103; and Iron Trade Rev., vol. 75, no. 16, Oct. 16, 1924, pp. 1028-1032, 6 figs. Details of exhibition of foundry equipment and supplies, including molding machines, sand handling and preparation machinery, pneumatic tools, etc.; new principle of molding-machine operation; new electrical equipment; crucibles, etc.

Molding Machines. See MOLDING MACHINES.

Molds. See MOLDS.

Pneumatic. See COMPRESSED AIR, Foundry Equipment.

Pneumatic Tools. Inereasing Foundry Output With Compressed Air, R. C. Skerrett. Can. Foundryman, vol. 15, no. 2, Feb. 1924, pp. 22-27, 18 figs. How compressed air and pneumatic tools make it possible for foundryman to do more and better work than would be possible without these modern aids.

Sand-Handling and Mixing. Equipment Speeds Output. Foundry, vol. 52, no. 24, Dec. 15, 1924, pp. 971-977, 17 figs. Continuous system, in use at foundry of Wilson Bros., Pontiac, Mich., involves mechanical equipment for handling sand, molds, iron and castings, resulting in increased production from decreased floor space in auto shop.

Standardization. Standardizing Pattern and Flask Equipment. Can. Foundryman, vol. 15, no. 10, Oct. 1924, pp. 44-45. Progress of work of joint committee. Eight national organizations unite to investigate pattern making and marketing, pattern plates and mounting, as well as flask sizes and other details.

Steel Foundry. Organization and Practice in a Steel Foundry Finishing Department, C. W. Heywood. Am. Foundrymen's Assn.—preprint no. 422, for meeting Oct. 11-16, 1924, 11 pp. Believes gang system produces most satisfactory results from standpoint of both output and costs. Where gang system is not feasible, another successful plan is to employ a pace maker. Layout of equipment has a great deal to do with best routing and these two features are discussed in detail.

Principles in Cast Iron Flask Design, H. Cohen. Iron Age, vol. 113, no. 16, Apr. 17, 1924, pp. 1137-1140, 7 figs. Applictaion to jarring-machine work on gray iron; general rules as to bars; core weights and supports; internal strains.

FOUNDRY PRACTICE. See FOUNDRIES; IRON FOUNDING; MOLDING METHODS.

FRAMING

Calculation. Calculation of Straight-Member Work with Fixed Corners (Die Berechnung der Geradstabwerke mit unverschieblichen Eckpunkten), P. Diem. Beton u. Eisen, vol. 23, nos. 1, 2, and 3, Jan. 5, 20, and Feb. 5, 1924, pp. 8-11, 18-20, and 29-32, 24 figs. Discusses calculation of framework of straight members, distribution of corner moments on several members, and determination of corner moments in members under load.

The Calculation of Skeleton Frameworks (Zur Berechnung räumlicher Rahmenwerke), E. Reisinger. Bauingenieur, vol. 5, nos. 1, 2, and 3, Jan. 15, 31, and Feb. 15, 1924, pp. 5-9, 28-32, and 57-59, 17 figs. Calculation of deformations of skeleton bars by means of an equation; its use for calculation of wedge-shaped skeleton frame.

Reinforced-Concrete, Moments of Inertia. Moments of Inertia in Reinforced-Concrete Frames (Trägheitsmomente bei Eisenbetonrahmen), Schnidtmann. Beton u. Eisen, vol. 23, no. 7, Apr. 5, 1924, pp. 75-77, 1 fig. Calculation of symmetrical straight double-hinged frames with uniformly distributed perpendicular cross-bar load.

Rigid, Elastic Behavior of. Effect of Rigidity of Fixing on Elastic Behavior of Frames (L'Influenza della rigidita degli incastri nel comportamento elastico di un telaio), G. M. Pugno. Ingegneria, vol. 3, no. 11, Nov. 1, 1924, pp. 374-384, 30 figs. Details of a convenient and rapid method for calculating elasticity, with examples.

Statics. Graphic Statics of Compound Framework (Zur graphischen Statik zusammengesetzter Fachwerke), T. Pöschl. Bauingenieur, vol. 5, no. 12, June 30, 1924, pp. 376-378, 5 figs. Discusses graphic determination of stresses in bars of compound; statically determinate framework by double shear method.

FREIGHT HANDLING

Car Loadings, Seasonal Indexes. Movement of the Product of Agriculture, W. L. Crum. Ry. Age, vol. 77, no. 16, Oct. 18, 1924, pp. 703-706, 5 figs. Study shows possible amplification of information on car loadings prepared by car-service division.

Containers, Demountable. Container Units in Motor Truck Freight Service. Ry. Rev., vol. 74, no. 14, Apr. 5, 1924, pp. 656-658, 4 figs. How Detroit United Ry. has developed new equipment to establish auxiliary motor-truck service, consisting of demountable unit container equipment.

L. C. L. Freight. Delivering Less-Than-Carload Freight by Motor Truck, R. D. Sangster. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924. pp. 415-421. Outline of practical working of St. Louis system, demonstrating regard in which it is held by both shipper and carrier; adaptability of system to store-door delivery; advantages of off-track freight stations; Harlan plan for Manhattan Island.

Departure in Handling Less than Carload Freight, F. F. Ford. Ry. Rev., vol. 74, no. 8, Feb. 23, 1924, pp. 320-321. Description of new method which reduces overtime, loss, and damage, and conserves equipment.

How English Cartage Practice Prevents Terminal Congestion, F. C. Horner. N. Y. Railroad Club—Proc., vol. 34, no. 3, Feb. 1924, pp. 7212-7222 and (discussion) 7222-7225. Description of English system of collection and delivery of l.c.l. freight.

Monorail Overhead Carrying System. Relieving Railway Terminal Freight Congestion, J. L. Miller. Can. Machy., vol. 32, no. 12, Sept. 18, 1924, pp. 34-36, 2 figs. In author's opinion, overhead carrying system of monorail type offers greatest degree of flexibility and economy in handling goods in freight sheds.

Perishable Freight. Transportation of Perishable Freight, G. H. Nelson. West. Soc. Engrs.—Jl., vol. 29, no. 1, Jan. 1924, pp. 23-27. Describes traffic and way it is handled.

Small-Consignment Commodity Distribution. Economical Freight Delivery, Jas. Paterson. New York R. R. Club—Proc., vol. 34, no. 8, Sept. 19, 1924, pp. 7334-7344, 5 figs. Small-consignment commodity distribution in London, Eng., and its environs.

Transhipment. Handling Transhipments at Crewe, L. M. S. Ry. Gaz., vol. 41, no. 2, July 11, 1924, pp. 44-48, 11 figs. About 24,000 packages are unloaded, sorted and reloaded every 18 hr. at Crewe transhipment shed, enabling approximately 85 per cent of traffic to be reloaded direct to destination, and effecting considerable saving in car use. Describes layout and arrangement of transhipment shed.

FREQUENCY

Lack of Unification in Japan. The Japanese Frequency Dilemma, M. Fukuda. Elec. Wld., vol. 83, no. 8, Feb. 23, 1924, pp. 380-382, 2 figs. Interconnection and superpower plans in Japan complicated by mixture of equipment rated at 25, 40, 50, and 60 cycles in different systems.

Resonant. The Determination of Resonant Frequencies and Decay Factors, E. Mallett. Instn. Elec. Engrs.—Jl., vol. 62, no. 330, June 1924, pp. 517-525, 14 figs. Shows how circle can be derived from ordinary resonance curve by simple graphical construction, and how from derived circle and original resonance curve a straight line can be drawn from which resonance frequency and damping are at once determined; constructions developed are explained by their application to telephone-receiver impedances and to electric circuits.

FREQUENCY CHANGERS

Bridge Arrangement. Frequency Changing Device, S. Chiba. Elecn., vol. 93, no. 2427, Nov. 21, 1924, pp. 576-577, 11 figs. Notes on principle of bridge arrangements.

Problems. Frequency Changers, K. Lubowsky. Electrician, vol. 93, nos. 2421 and 2422, Oct. 10, and 17, 1924, pp. 404-405 and 436-437, 4 figs. Oct. 10: Various systems employed; control problems; load distribution. Oct. 17: Methods of control; need for careful examination.

Set. A 35,000 KW Synchronous Frequency Changer Set, M. W. Smith. Elec. Jl., vol. 21, no. 7, July 1924, pp. 343-346, 4 figs. See also Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, p. 709, 1 fig. Describes set of Brooklyn Edison Co. consisting of 35,000 kw. 11,400 volt, 3-phase, 25-cycle synchronous generator and 47, 500 hp., 3-phase, 60-cycle, 13,800 volt synchronous motor.

Static Transformers as. See TRANSFORMERS, Static.

FRICTION

Sliding Contacts. An Investigation of the Friction between Sliding Surfaces, with Special Reference to the Effects Produced by Electric Currents Passing Across Such Surfaces, H. Monteagle Barlow. Instn. Elec. Engrs.—Jl., vol. 62, no. 326, Feb. 1924, pp. 133-159, 33 figs. Describes experiments designed to elucidate these processes, based on which attempt is made to build up comprehensive theory of their action. Bibliography.

FRICTION GEARING

Fieux System. Fieux System of Friction Gearing and Its Application to Railway Motor Cars as Automatic Gearing [Le conjoncteur-disjoncteur à friction (Systéme Fieux), son application aux véhicules automoteurs comme embrayage automatique], J. Fieux. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 136, no. 3, Mar. 1924, pp. 279-287, 8 fig. Properties and action of Fieux make-and-break friction gear, and examples of application to railway motor cars.

Slip. Experiments on the Friction of Solid Bodies (Versuche über die Reibung fester Körper), Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 1, Feb. 1924, pp. 1-32. Investigation of slip of driving disk in excess of distance corresponding to its actual revolution; deals with changes in surfaces and their influence on friction values, and progress of slip at different speeds, with normal and peripheral forces; deformations of disks as cause of slip; gives coefficients of friction for various combinations of metals, wood and leather.

Uses. Transmission by Means of Friction Wheels (Les transmissions par galets de friction). Génie Civil, vol. 84, no. 23, June 7, 1924, pp. 549-551, 6 figs. Use of friction wheels and disks; transmission efficiency; coefficient of friction, etc.

FUEL ECONOMY

Boiler Plants. See BOILER PLANTS, Fuel Economy.

Bonus System. See BONUS SYSTEMS, Fuel Saving.

Chemical Plants. See CHEMICAL PLANTS, Fuel Economy.

Coal Mines. Low-Grade and Waste Fuels for Steam-Raising, J. B. C. Kershaw. Colliery Eng., vol. 1, no. 10, Dec. 1924, pp. 453-455, 7 figs. Describes plants suitable for utilizing refuse fuels in England and in other countries.

Furnace Operation. Conserving Our Industrial Fuels, G. R. Brandon. Iron Trade Rev., vol. 75, no. 13, Sept. 25, 1924, pp. 799-801. Great economies available to users of furnaces through efficient installation and operation. Some methods whereby considerable saving may be accomplished.

Glass Plants. See GLASS MANUFACTURE, Fuel Economy in.

High Temperature and. Fuel Economy and the Measurement of High Temperatures, R. Hadfield.

Iron & Coal Trades Rev., vol. 109, no. 2946, Aug. 15, 1924, pp. 273-274. Discusses steam boilers, forge furnaces and furnaces for heat treatment of steel, temperature measurement in furnace, flame temperature and furnace efficiency, regenerators and recuperators, heat transmission and heat balance in furnaces and melting furnaces. (Abstract.) Paper read before World Power Conference.

Home Heating. The Fuel Situation of the Home, S. S. Wyer. Engrs. & Eng., vol. 41, no. 12, Dec. 1924, pp. 309-313 and (discussion) 313-317, 3 figs. Author shows that electric house heating is not within realm of practical; therefore future problem must be solved, first, by more rational attitude towards anthracite use; secondly, by appreciation that coke can be used to replace anthracite; thirdly, by wider and more extensive use of manufactured gas.

Metallurgical Works. Works Problems and Methods in Fuel Economy, R. Hadfield. Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1066-1067. Certain problems met with in practice and some methods by which they may be attached; general considerations regarding heat balance, furnace efficiency; importance of high-temperature research, use of pyrometers, and temperature colors. Abstract of paper read before Iron & Steel Sec., Empire Min. & Met. Congress.

National Problems of United States. Fuel as a National Problem, H. O. Loebell. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 288-290. Analysis of present situation in United States shows that there is no system or standardization or even logic in manner in which various fuel resources are being consumed; need of centralization in fuel production and distribution; future cost of gas; economy in fuel, railways, and mines.

Practical Aspects. Some Practical Aspects of Fuel Economy, C. W. Mitman. Smithsonian Instn. (Wash.) Miscellaneous Collections, vol. 76, no. 1, June 2, 1923, 19 pp., 2 figs. Extent to which average consumer may reasonably expect to profit from available data. Discusses quality of coal, furnace control, and furnace installation, the three important factors in furnace operation.

Railways. Heat Economy and Railway Service, Landsberg. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 170-172. Points out that German state railways consume 9 to 12 per cent of total German coal production; economic efficiency of locomotives; influence of load; other fuel consumers.

Personnel in Fuel Economy, U. L. Richards. Railroad Herald, vol. 28, no. 2, Jan. 1924, pp. 31-32. See also Ry. & Locomotive Eng., vol. 37, no. 1, Jan. 1924, pp. 7-12. Education and selection of employees. Extract from prize-winning paper in Int. Ry. Fuel Assn. contest.

See also RAILWAY OPERATION, Fuel Economy.

Rubber Preparation. Fuel Conservation in Connection with the Preparation of Rubber, B. J. Eaton. India-Rubber Jl., vol. 68, no. 11, Sept. 13, 1924, pp. 15-17. Deals with producer's and buyer's point of view; manufacturer's requirements; elimination of fuel in preparation of rubber; substitution of fuels other than wood; preparation of other types of raw rubber.

Steel Works. Works Problems and Methods in Fuel Economy, R. Hadfield. Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1066-1067. Discusses problems in practice and methods to attack them; heat treatment and reheating furnaces, gas-fired furnaces; regeneration and recuperation, melting efficiency, etc. Abstract of paper read before Iron & Steel Sec., Empire Min. & Met. Congress.

Temperature Measurement, Importance of. Fuel Economy and the Measurement of High Temperatures, R. Hadfield. Foundry Trade Jl., vol. 30, no. 419, Aug. 28, 1924, pp. 179-181. Survey of fields where pyrometry has enabled accurate heat balances to be obtained, including steam boilers, forge furnaces, furnaces for heat treatment of steel, and open-hearth furnaces. Temperature measurement in France; flame temperature and furnace efficiency; regenerators and recuperators. Abstract of paper read before First World Power Conference.

Works Problems and Methods. Works Problems and Methods in Fuel Economy, R. Hadfield. Colliery Guardian, vol. 128, nos. 3314 and 3315, July 4 and 11, 1924, pp. 22 and 92-93. Shows how far rapid approximate methods can be made use of in controlling fuel utilization. Abstract of paper read before Empire Min. & Met. Congress.

FUELS

Anthracite Substitutes for Domestic Use. Fuels Available for Domestic Use as Substitutes for Anthracite Coal, R. Kudlich. Engrs. & Eng., vol. 41, no. 4, Apr. 1924, pp. 100-104. Discusses steam sizes of anthracite, Virginia and Arkansas anthracite, bituminous coal, semi-bituminous coal, medium and high voltage bituminous coal, coke, petroleum coke, liquid fuel, and gaseous fuel.

Bagasse. See BAGASSE.

Blast-Furnace Gas. See BLAST-FURNACE GAS.

Briquet and Ovoid, Manufacture. Briquette and Ovoid Fuels. Colliery Engr., vol. 1, no. 3, May 1924, p. 116. Survey of methods employed in manufacturing patent fuels.

Canadian Problems. Report of Institute Fuel Committee. Eng. Jl., vol. 7, no. 11, Nov. 1924, pp. 678-682, 2 figs. Summary of conclusions, introduction, review of preliminary activities, submitted by Fuel Committee of Eng. Inst. Can.

The Fuel Problem, Chas. Camsell. Eng. Jl., vol. 7, no. 4, Apr. 1924, pp. 186-190. Also Combustion, vol. 11, no. 1, July 1924, pp. 46-50. Review of fuel situation in Canada, problems, and progress towards solution; substitutes for anthracite.

Canadian Resources. The Fuel Resources of Canada and Their Utilization for the Production of Power and Other Purposes, B. F. Haanel. Eng. Jl., vol. 7, no. 7, July 1924, pp. 361-382, 15 figs. Fuel resources; production, consumption, imports and exports; preparation of solid fuels for industrial and other uses; value of Canadian solid fuels for steam raising and production of a power and industrial gas; carbonization of peat, oil shales, and lower grade coals and relation of carbonization of coals to production of power.

Carbon Determination in. Determination of Carbon in Organic Substances and Fuels by Oxidation with a Mixture of Sulphuric and Chromic Acids (Dosage du carbone dans les substances organiques et les combustibles par oxydation sulfo-chromique), D. Florentin. Chimie & Industrie, vol. 11, no. 5, May 1924, pp. 875-879. Points out that digestion of organic substances or of fuels with mixtures of chromic and sulphuric acids invariably yields low results unless catalyst is present; most efficient catalyst is mercuric sulphate, but even in presence of this substance a small amount of CO is evolved, although organic compounds in general yield only CO_2.

Carbonization. Carbonization of Fuel (Zur Vergasung der Brennstoffe), Von Hofrat and H. von Jüptner. Feuerungstechnik, vol. 13, nos. 3 and 4, Nov. 1 and 15, 1924, pp. 21-24 and 35-41, 11 figs. Discusses degasification or dry distilla-

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tion, by means of free oxygen, steam, half-gas or Dowson gas, blast-furnace gas, and metal oxides along, and their reactions.

Chemical Composition. Chemical Bases of Fuel Utilization (Die chemischen Grundlagen der Brennstoffverwertung), W. Franckenstein. Zeit. für Technische Physik, vol. 5, no. 7, 1924, pp. 293-299. Discusses fuel analysis, determination of calorific value, volatiles, tar, etc.; distillation of coal and lignite, production of tar, liquid and gaseous fuel.

Coal. See COAL; PULVERIZED COAL.

Coke. See COKE.

Colloidal. Experimental Preparation of Colloidal Fuel, A. V. Sapoznikow and M. N. Kalinin. Petroleum & Oil-Shale Industry, vol. 5, no. 11-12, Nov.-Dec. 1923, pp. 652-654. (In Russian.)

Combined-Water Content in Solid. Content of Combined Water in Solid Fuels (Over het gebonden watergehalte van vaste brandstoffen), D. J. W. Kreulen. Chemisch Weekblad, vol. 21, no. 15, Apr. 12, 1924, pp. 174-176, 1 fig. Determination of dehydration curves of peat, lignite, and some 20 coals of recent formation; combined water can be detected by hygroscopic nature of dried fuel; those fuels which contain only colloidally held water are not hydroscopic when dried.

Combustion. An Investigation of the Maximum Temperatures and Pressures Attainable in the Combustion of Gaseous and Liquid Fuels, G. A. Goodenough and G. T. Felbeck. Univ. of Ill.—Bull., no. 139, Mar. 1924, 158 pp., 27 figs. Résumé of important laws of gas mixtures; general theory of chemical equilibrium, and derivation of equilibrium equations for various reactions; develops energy equation, and shows method of solving system of equations for maximum temperature; comparisons and applications of theory.

How Much Work Can Be Obtained from a Pound of Fuel?, L. S. Marks. Power, vol. 60, no. 14, Sept. 30, 1924, pp. 536-539, 5 figs. Ranking cycle obsolescent as efficiency basis; new standard needed; proposed method based on step-by-step application of "Second Law"; Rankine comparison misleading in case of regenerative cycles and of steam-mercury plants.

Equivalent Fuel Values. See HEAT, Equivalent Values Produced by Fuels.

Factory Refuse. Generation of Power with Factory Refuse, F. Johnstone-Taylor. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 326-328, 3 figs. Wood wastes and other refuse used for generating steam and producer gas; description of suction gas producer; operating results; gas storage, boiler firing by gas.

French Colonies. French Colonial Fuels (Combustibles et carburants coloniaux), R. Fouque. Génie Civil, vol. 85, nos. 14 and 15, Oct. 4 and 11, 1924, pp. 296-298 and 315-318. Study of fuel resources, both liquid and solid, of the French colonies; findings apply to tropical countries generally; of the French colonies, only Madagascar possesses crude oil deposits of importance; liquid fuels or substitutes must therefore be supplied by vegetation products of various kinds; gives list of plants that furnish oil, and describes engines capable of burning these oils.

Furnace Residue. Investigation of Furnace Residue of Anthracite (Zur Kenntnis und zur Untersuchung der Feuerungsrückstände von Steinkohlen), E. Donath. Berg- u. Hüttenmännisches Jahrbuch, vol. 71, no. 4, 1923, pp. 24-27. Describes modification of method for preparation of residue according to which ferrous oxide and sulphur compounds and, in fact, main part of mineral substances are dissolved away.

Gaseous. Fuel of the Future. What Shall It Be?, I. Ginsberg. Am. Gas Jl., vol. 121, nos. 20, 24, and 28, Oct. 18, Nov. 15, and Dec. 13, 1924, pp. 1081-1082 and 1095-1098; 1173-1174 and 1189-1190; 1261-1262 and 1275-1277. Oct. 18: Value of gas as a fuel and its calorific power. Nov. 15 and Dec. 13: Heat treatment of metals; general details of process.

Theoretical Comparative Study of the Principal Gaseous Fuels from Viewpoints of Lighting and of Power Generation (Etude théorique comparée des principaux combustibles gazeux aux points de vue de l'éclairage et de la force motrice), H. Pariselle. Chimie & Industrie, vol. 11, no. 4, Apr. 1924, pp. 651-656. Calculation of combustion temperatures, and conclusions to be drawn therefrom; evaluation of power developed in engine by gaseous fuel.

See also Liquid; GAS, Fuel.

Heating Value. Calorimetric Determination of Heating Value of Solid Fuels (Die kalorimetrische Bestimmung des Heizwertes fester Brennstoffe), Kraftmaschine, vol. 21, no. 21, Nov. 10, 1924, pp. 226-228. Describes calorimeter used and its application, moisture content, hydrogen content, etc.

Direct Determination of Heating Value of Solid and Liquid Fuels (Détermination directe du Pouvoir calorifique des combustibles solides ou liquides), Ch. de la Condamine. Chaleur & Industrie, vol. 5, no. 46, Feb. 1924, pp. 85-91, 2 figs. Describes method and apparatus used; numerical example. Bibliography.

Heating Values and Composition of Fuels (Heizwerte und Zusammensetzung von Brennstoffen). Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 1-2 and 3-4, Jan. 31 and Feb. 29, 1924, pp. 1 and 23-24. Investigation of fuels during 1923 in chemical laboratory of Bayerischer Revisions-Verein, including anthracite, brown coal and lignite, briquets, coke, peat, wood, liquid fuels, etc.

Relative Heating Value of Fuels, R. O. Wynne-Roberts. Can. Engr., vol. 47, no. 27, Dec. 30, 1924, pp. 643-644. Important factors to be considered when comparing value of fuels. Kitchen and furnace tests.

Ignition Temperature, Determination of. New German Instrument Determines Ignition Temperature. Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, p. 6, 1 fig. Details of Krupp electric stove for determining ignition temperature of fuels.

Lignite. See LIGNITE.

Lignite Briquets as. See LIGNITE, Briquetting.

Lignite Char. Tests of Lignite Char as Reduction Fuel in the Smelting of Zinc Ores, B. M. O'Harra. U. S. Bur. Mines—Reports of Investigations, no. 2575, Feb. 1924, 7 pp. Analysis and characterictics of and experiments made with "char," the fuel produced by a simple carbonizing oven devised by Bur. of Mines which is essentially a vertical shaft with means for supplying raw lignite at top and discharging carbonized lignite at lower end. From Zinc Inst. Bul., Jan. 1924.

Lignite and Bituminous Mixtures. Burning Mixtures of Lignite and Bituminous, A. Canfield. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 476-477, 4 figs. Experiments carried out at power plant of State Mill & Elevator, Grand Forks, N. Dak., during past six months to determine most economical ratio of lignite to be burned with Eastern bituminous.

Liquid and Gaseous. Burning Liquid and Gaseous Fuels. Power Plant Eng., vol. 28, no. 11, June 1, 1924, pp. 586-587, 1 fig. Experience with burners, furnace design and air preheaters. (Abstract.) Report of Prime Movers Committee of N. E. L. A.

Locomotive. See LOCOMOTIVES, Fuels.

Oil. See OIL FUEL.

Oil and Coal, U. S. Resources. Fuel Oil and Coal Resources of the U. S., Chas. E. Bowles. Oil & Gas Jl., vol. 23, no. 26-A, Nov. 20, 1924, pp. 21, 136-137 and 140. Comparison of markets and supplies, differentiating industries and uses where competition between them is possible.

Peat. See PEAT.

Producer Gas. See PRODUCER GAS.

Pulpwood Bark. Utilization of Pulpwood Bark for Fuel, J. D. Rue and E. P. Gleason. Paper Trade Jl., vol. 78, no. 16, Apr. 17, 1924, pp. 40-50, 10 figs. Final report of Sub-Committee on Utilization of Bark, Committee on Waste of Technical Assn. Pulp & Paper Industry, dealing with possible methods of utilization, present practice in barking, bark presses, and furnaces for burning bark.

Pulverized Coal. See PULVERIZED COAL.

Recovery from Ash. See COAL, Recovery from Ashes.

Refuse. Power Production from Town's Refuse, D. Wilson. Power Engr., vol. 19, no. 224, Nov. 1924, pp. 417 and 426, 1 fig. Review of present-day achievements.

The Refuse Fuel Question. Eng. & Boiler House Rev., vol. 37, no. 9, Apr. 1924, pp. 331-332, 2 figs. Heating value and general qualities of some of the fuels available in boiler plants.

See also REFUSE DISPOSAL, Destructors.

Relative Value. Relative Value of Fuels, R. O. Wynne-Roberts. Am. Gas Jl., vol. 121, no. 9, Aug. 30, 1924, pp. 791-792 and 806. Discusses heat service, waste incurred in use of all fuels, relative value of gas and other fuels, efficiency of gas of different qualities, etc.

Research. The Work of the Fuel Research Board, C. H. Lander. Inst. Min. Engrs.—Trans., vol. 64, part 5, Feb. 1924, pp. 243-253 and (discussion) 253-261. Also Colliery Guardian, vol. 127, no. 3291, Jan. 25, 1924, pp. 213-214; and Iron & Coal Trades Rev., vol. 108, no. 2916, Jan. 18, 1924, pp. 87-88. Physical and chemical survey of national coal resources; carbonization of coal; H. M. fuel research station; low-temperature and high-temperature carbonization; etc.

Russian, Cost of. Comparative Cost Difference of Solid and Liquid Mineral Fuels (Russian), G. Grigoryan. Oil Bul. of Soviet Industry, vol. 2, no. 12, June 15, 1924, pp. 2-5. Discussion of comparative costs for Russia of use of solid and liquid fuels under assumption that plants are already equipped for use of liquid fuel and vice versa.

Sawmill Waste. Drying of Sawmill Waste in Nordström's Drying Tower (Torkning av sågverksavfall i Nordströms torktorn), E. Spetz. Teknisk Tidskrift, vol. 54, no. 10, Mar. 8, 1924, pp. 17-22 (Kemi), 6 figs. Drying towers with artificial circulation of hot air will increase value of sawmill waste as fuel and effect savings of over 25 per cent in fuel consumption. Figures from detailed investigation.

Sewage Sludge. Sewage Sludge as a Source of Heat. Contract Rec. & Eng. Rev., vol. 38, no. 20, May 15, 1924, pp. 478-479. Experiments carried out in England by burning sludge direct in a furnace and by utilizing gas made by carbonizing it; special furnace is solution.

Smokeless. Maclaurin Process for Making Smokeless Fuel, E. K. Scott. Power Engr., vol. 19, no. 223, Oct. 1924, pp. 389-390, 2 figs. Principles and details of process.

See also COAL, Carbonization.

Solid, Chemical Constitution. Modern Theories on the Chemical Constitution of Solid Fuels (Les théories modernes sur la constitution chimique des combustibles solides), E. Audibert and A. Raineau. Chimie & Industrie, vol. 11, nos. 2 and 3, Feb. and Mar. 1924, pp. 229-247 and 434-448, 1 fig. See also Revue de l'industrie Minérale, no. 78, Mar. 15, 1924, pp. 127-171, 1 fig. Review of works on this subject during recent years: Constituents of higher plants; carbon hydrates; natural state, properties and constitution of lignines; humic acids; conversion from plant to humic acid and from humic acid to humic substances; investigations tend to confirm existing lack of knowledge on subject of chemical constitution of solid fuels.

Solid, Test Code for. Test Code for Solid Fuels. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 558-562, 5 figs. Preliminary draft of a code in series of nineteen being formulated by A. S. M. E. Committee on Power Test Codes.

Storage Houses. Design Features of a Large Concrete Fuel House, E. L. Crowe. Eng. & Contracting (Bldgs.), vol. 62, no. 4, Oct. 22, 1924, pp. 929-933, 5 figs. A 750,000-cu. ft. structure for holding sawdust and wood-refuse fuel for 3000-hp. border installation at mill of Crossett Lumber Co., Crossett, Ark.

Technology. Notes on Recent Developments in Fuel Technology, R. Wigginton. Fuel, vol. 3, no. 10, Oct. 1924, pp. 343-345. Utilization of coal in America; steam accumulator; pulverized fuel; cracking of oils; purification of coal gas; atomic energy as source of power; coking power of coal.

FULLERS' EARTH

Properties and Uses. See OIL INDUSTRY, Fullers' Earth in.

Utilization. Marketing of Fullers' Earth, A. B. Parsons. Eng. & Min. Jl.—Press, vol. 118, no. 20, Nov. 15, 1924, pp. 771-773. A clay invaluable in bleaching of mineral and edible oils. Analyses; production; methods of utilization; characteristics of an earth used for breaching edible oils.

FUMES

Protection Against. See DUST, Protection Against.

FURFURAL

Corncobs, from. Furfural from Corncobs, G. H. Mains and F. B. LaForge. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 356-359, 1 fig. Economic aspect of furfural production.

FURNACES

Annealing. See FURNACES, ANNEALING.

Crucible High-Temperature Solid-Fuel. A High Temperature Fuel Furnace for Crucibles, Wm. Mason. Chem. Eng. & Min. Rev., vol. 17, no. 194, Nov. 5, 1924, pp. 55-57, 7 figs. Details of solid-fuel high-temperature furnace for melting alloys.

Cupolas. See CUPOLAS.

Enameling. See FURNACES, ENAMELING.

Forging. See FURNACES, FORGING.

Gas. See FURNACES, GAS.

Heat Transfer Caused by Radiation of Gases. Heat Transfer in Furnaces as Caused by Radiation of Gases. Fuels & Furnaces, vol. 2, no. 7, July 1924, pp. 675-678, 2 figs. Equations presented which more or less upset modern theory of heat transfer and re-establish truth of older theories.

Heat-Treating. See FURNACES, HEAT-TREATING.

Heating. See FURNACES, HEATING.

Industrial. See FURNACES, INDUSTRIAL.

Metallurgical. See FURNACES, METALLURGICAL.

Open-Hearth. See OPEN-HEARTH FURNACES.

Recuperator. The Chapman-Stein Recuperator, W. C. Buell, Jr. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 327-332 and (discussion) 333-339, 12 figs. Describes number of installations in use of this type which is said to have best succeeded in eliminating two main troubles, leakage and breakage.

Roasting. See FURNACES, ROASTING.

Temperature Control. See TEMPERATURE CONTROL.

FURNACES, ANNEALING

Electric. See ELECTRIC FURNACES, Annealing.

Fisher. New Annealing Equipment for Strip Steel. Iron Age, vol. 114, no. 15, Oct. 9, 1924, pp. 907-909, 5 figs. Notes on new annealing equipment of Worcester Pressed Steel Co., Worcester, Mass. Electric mule on rack for charging; ample combustion space in furnaces; arrangement for cooling boxes and quick charging of furnaces.

Steel Wire. Furnaces for Wire Annealing. Fuels & Furnaces, vol. 2, no. 3, Mar. 1924, pp. 245-246, 4 figs. Coal-fired pot furnaces for black and bright annealing and recuperative furnaces of German design.

FURNACES, ENAMELING

Electric. Continuous Conveyor Type Electric Enameling Furnace. West. Machy. Wld., vol. 15, no. 10, Oct. 1924, pp. 351-352, 1 fig. Describes furnace developed by C. C. Armstrong of Armstrong Mfg. Co., Huntington, W. Va., for enameling comparatively flat pieces whereby opening and closing of charging doors is eliminated through medium of a conveyor which carries work through furnace from charging end and discharges it at opposite end. Heating chamber is 9 ft. 8 in. long, 30 in. tall, and 32 in. wide.

Electricity vs. Oil Heating. Electricity Versus Oil for Heating Iron Enameling Furnaces, H. A. Mulvaney. Jl. of Elec., vol. 52, no. 12, June 15, 1924, pp. 487-490, 6 figs. Description of application of electricity to manufacturing with resultant improvement in product, reduced spoilage, and decreased cost of production.

Gas-Fired, Heat Balance of. The Heat Balance of a Gas Fired Enameling Furnace, L. E. Biemiller. Gas Age-Rec., vol. 53, no. 18, May 3, 1924, pp. 621-622 and 626, 2 figs. Thermal analysis of operating results of furnace which has been in operation in Baltimore, Md., for several years.

FURNACES, FORGING

Heat Economy. Heat Economy of Coal Fired Rolling and Forging Furnaces. Fuels & Furnaces, vol. 2, no. 2, Feb. 1924, pp. 119-121. Heat distribution, economy and coal consumption of various types of furnaces with brick recuperators, cast-iron recuperators, and waste-heat boilers.

FURNACES, GAS

Specific Heat of Combustion Products. Specific Heats of Products of Combustion from Gas Furnaces, L. E. Biemiller. Gas Age-Rec., vol. 53, no. 14, Apr. 5, 1924, pp. 423-425, 1 fig. Determination of specific-heat values; review of previous work on the subject, and calculations.

FURNACES, HEAT-TREATING

American Types. The Heat Treatment of Metals (Die Wärmebehandlung der Metalle), Geo. Schlesinger. Werkstattstechnik, vol. 18, no. 23, Dec. 1, 1924. Account of exhibits relating to heat treatment of metals at Machine Tool Exhibition in New Haven and Boston; tendencies in design of furnaces.

Continuous. Continuous Furnaces Prove Advantageous In Heat Treating Automobile Parts, E. C. Cook. Fuels & Furnaces, vol. 2, no. 4, Apr. 1924, pp. 341-346, 8 figs. Notes on furnaces used for annealing, hardening, quenching and tempering at plant of Chevrolet Motor Ohio Co., at Toledo, Ohio.

Continuous Heat-treating Furnaces, H. M. Groff. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 10-12, 3 figs. Describes small furnace of bench type for hardening and tempering round wire or flat stock of the smaller sizes, and a furnace for handling individual parts. Both may be gas or electrically heated.

Heat Treating at the Chevrolet Plant. Iron Age, vol. 114, no. 3, July 17, 1924, pp. 129-131, 2 figs. Describes conveyor-type continuous heat-treating furnace of new design recently made in axle and gear plant of Chevrolet Motor Co., Detroit, and its operation. Is a combination continuous hardening and drawing furnace of a double-deck type and a unique feature is that drawing furnace is located above hardening furnace and is fired by waste heat from latter.

Heat-Treating Furnaces of Continuous Type, G. L. Lacher. Iron Age, vol. 113, no. 15, Apr. 10, 1924, pp. 1067-1072, 10 figs. Quality treating in quantity; unique conveyor systems at new steel-treating plant of Hupp Co.; Brinell testing of every axle.

Electric. Electric Furnaces, With Special Reference to the Heat Treatment of Steel, L. W. Wild. Eng. Production, vol. 7, no. 136, Jan. 1924, pp. 20-23, 11 figs. Discusses hardening, normalizing, annealing, tempering, and carburizing, and suitable furnaces.

See also ELECTRIC FURNACES, Heat-Treating.

Gas- vs. Oil-Fired Hardening. Gas vs. Oil Firing for Hardening Plants (Gas- oder Oelfeuerung für Härteanlagen), Fr. Messinger. Wärme, vol. 11, no. 2, Jan. 11, 1924, pp. 15-16, 5 figs. Reconstruction of salt-bath hardening furnace by changing from oil to gas firing; hardening and maintenance of temperature; reduction of size of annealing chamber underneath crucible with gas firing; arrangement of burner; positive regulation of gas-air mixture; results with regard to time required for starting fire, hourly rate of fuel consumption, and quantity of heat consumed; efficiency.

Recuperative. Heat-Treating Furnaces Using Recuperation, P. J. Nutting. Iron Age, vol. 113, no. 16, Apr. 17, 1924, pp. 1156-1157, 2 figs. Effect of preheating air, using coal, oil, or other fuels; applications to annealing and carburizing.

FURNACES, HEATING

[See also FURNACES, REVERBERATORY.]

Continuous Pair. Pair Heating, Wm. C. Buell, Jr. Blast Furnace & Steel Plant, vol. 12, nos. 2, 3, and 4, Feb., Mar., and Apr. 1924, pp. 122-123, 159-160, and 180-182, 3 figs. Résumé of conditions surrounding present practice in heating sheet bars; describes heating furnace of new design and employing two-stage combustion; analysis of heating costs.

Oil-Burning. Furnace Installation for Heating Nickel, Geo. Ellerton, Jr. Iron Age, vol. 114, no. 25, Dec. 18, 1924, pp. 1595-1597, 4 figs. Double-chamber oil-fired units for heating slabs for rolling and for annealing, installed in plant of Am. Nickel Corpn., Clearfield, Pa.; automatic control provided.

Oil- and Gas-Heated. Recuperation for Oil and Gas Heated Furnaces, A. E. Walden. Gas Age-Rec., vol. 53, no. 4, Jan. 26, 1924, pp. 97-98 and 122, 3 figs. Design of industrial heating furnaces for increased economy in operation.

Pulverized-Coal Firing. See PULVERIZED COAL, Forging and Rolling-Mill Furnaces; Heating Furnaces.

Rail-Heating. Rails Heated for Rerolling in Stoker Fired Furnaces, Elmer C. Cook. Fuels & Furnaces, vol. 2, no. 1, Jan. 1924, pp. 27-29, 1 fig. Continuous furnaces at Sweet's Steel Co. used in recovery of old rails.

Regenerative. Atomizing Agents for Fuel Oil in Regenerative Furnaces, G. H. Heine. Fuels & Furnaces, vol. 2, no. 7, July 1924, pp. 650-652, 1 fig. Gives results of series of experiments made to determine proper oil atomizing agent for regenerative reheating furnaces of Stevens type.

New Furnaces Serve Forge Press. Iron Trade Rev., vol. 75, no. 25, Dec. 18, 1924, pp. 1648-1650, 3 figs. Unit completed by A. Finkly & Sons Co., Chicago, forging manufacturer, is equipped with five oil-fired, regenerative-type heating furnaces and 1000-ton steam-hydraulic press; finishing department is included.

The Investigation of a Regenerative Ingot-Heating Furnace (Die Untersuchung eines Regenerativ-Stossofens), G. Neumann. Stahl u. Eisen, vol. 44, no. 50, Dec. 11, 1924, pp. 1611-1619, 7 figs. Investigation of furnace with blast-furnace-gas heating and cold charge; influence of ingot-heating curve; defects shown by investigation; influence of radiation of surrounding wall surfaces on temperature measurement with ordinary pyrometers.

Reheating. Operation Costs of Reheating Furnaces Reduced, H. L. Read. Iron Age, vol. 113, no. 26, June 26, 1924, pp. 1864-1865, 2 figs. Installation of burners for coke-oven gas in which air proportion is maintained automatically.

Sheet and Pair. Modern Sheet and Pair Furnaces Described, A. W. Peters. Fuels & Furnaces, vol. 2, no. 3, Mar. 1924, pp. 227-230, 2 figs. Well-insulated one-valve control furnaces effect saving of 43 per cent in gas consumption over old furnaces and secure uniform and controllable furnace atmosphere.

FURNACES, HOT-AIR

Anthracite or Bituminous Coal with. Performance of a Warm-Air Furnace with Anthracite and Bituminous Coal, A. P. Kratz. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 5, May 1924, pp. 383-389, 5 figs. Account of tests to compare performance of same furnace operating with anthracite and bituminous coal, and to determine effect of use of slotted firepot on operation with bituminous coal.

Gas-Fired. Gas as Fuel for Warm-Air Furnaces, Thos. Newton. Sheet Metal Worker, vol. 15, no. 21, Nov. 7, 1924, pp. 783 and 810, 2 figs. Brief explanation of what is being done in England in way of gas heating.

Making Progress With the Hot Air Furnace. Gas Age-Rec., vol. 53, no. 15, Apr. 12, 1924, pp. 473-474, 5 figs. Particulars of furnace developed by Rochester Gas & Elec. Corpn., entirely automatic, being equipped with a humidostat as well as a thermostat; heat loss to chimney is low, as gases pass off at 170 deg. fahr. as against 300 to 500 deg. fahr. in coal-fired furnaces.

FURNACES, INDUSTRIAL

Ceramic, Temperature Measurement. Temperature Measurement in the Ceramic Industry (Temperaturmessungen in der Keramik), F. Linke. Tonindustrie-Zeitung, vol. 48, no. 84, Oct. 18, 1924, pp. 941-944, 16 figs. Deals with Seger cones, thermoelectric pyrometers, ardometers, Holborn-Kurlbaum pyrometers, etc.

Coal-Dust Firing. See COAL DUST, Firing with.

Combustion Devices. Combustion Devices for Gaseous Fuels, W. Trinks. Fuels & Furnaces, vol. 2, nos. 10, 11, and 12, Oct., Nov., and Dec. 1924, pp. 1035-1038, 1157-1160, and 1249-1252, 31 figs. Classification and description of types mixing gas and air inside furnace. Burners which induce air from atmosphere with varying degrees of premixing. Burners which work with complete mixing of gas and air before mixture enters furnace proper.

Electricity, Use in. Furnaces and Heat Sources, E. F. Collins. Fuels & Furnaces, vol. 2, no. 5, May 1924 pp. 479-483. Reasons for wider and more general adoption of electric heat in past few years. Some fundamental considerations which determine when electric heat should be used.

Gas-Fired. Gas-Furnace Installations, Hems. Gas Jl., vol. 166, no. 3182, May 7, 1924, pp. 400-403, 1 fig. Different types of furnaces and industrial apparatus which manufacturers of a city demand, including oven and muffle furnaces, furnaces for melting, tube manufacture, sugar boiling, cyanide hardening, etc.

Modern Industrial Gas Furnaces (Ueber moderne Industriegasfeuerungen und deren Einführung), W. Zedler. Gas- u. Wasserfach, vol. 67, no. 40, Oct. 4, 1924, pp. 596-598. Advantages of gas firing and its applications; Pharos system of gas firing, and possibility of precision firing.

Heat Loss from Walls. See HEAT TRANSMISSION, Problems.

Insulation, High-Temperature. High Temperature Insulation. Iron Trade Rev., vol. 76, no. 2, Jan. 8, 1925, pp. 151-153, 2 figs. Statement of fundamentals in problem of reducing heat losses from industrial furnaces; includes table showing effect of insulating various thicknesses of walls at different temperatures; determining rate of conduction. Abstracted from lecture for educational purposes by Celite Products Co., Chicago.

Recuperation. Recuperation—Design Requirements, E. R. Posnack. Combustion, vol. 10, no. 6, June 1924, pp. 439-440. Features of design which should be incorporated to eliminate objections usually raised to use of recuperators.

Recuperation—Its Advantage, E. R. Posnack. Combustion, vol. 10, no. 5, May 1924, pp. 362-363. Advantages of recuperation in industrial furnaces.

Tunnel. Use of Tunnel Furnaces in the Fireproof Industry (Die Verwendung von Tunnelöfen in der feuerfesten Industrie), W. Pohl. Tonindustrie-Zeitung, vol. 48, nos. 85 and 86, Oct. 22 and 25, 1924, pp. 958-960 and 971-973, 2 figs. Design, construction, and operation of tunnel furnaces for burning brick and similar goods.

Waste-Heat Recovery. See WASTE HEAT, Industrial Furnaces.

FURNACES, METALLURGICAL

Aluminum-Melting. Aluminum and Aluminum-Alloy Melting Furnaces, R. J. Anderson. Am. Foundrymen's Assn.—Preprint for meeting June 5-9, 1924, 44 pp., 14 figs. Reviews work undertaken by U. S. Bur. Mines to decrease metal and fuel losses in melting aluminum and its light alloys. All of the types of furnaces used in United States for rolling-mill practice, foundry practice, for die casting and permanent mold practice, and for smelting and refining are mentioned. Detailed information and descriptions of pit, stationary and tilting crucible, stationary and tilting iron pot, open flame, reverberatory, and

electric furnaces. Factors governing selection and operation of furnaces. Information regarding melting temperatures. Selected bibliography in which many articles pertaining to aluminum alloy melting furnaces are listed.

Melting Aluminum for Rolling into Sheet, J. A. Lange. Am. Foundrymen's Assn.—Preprint for meeting June 5-9, 1924, 11 pp., 1 fig. Tests were conducted on melting pots, and tilting reverberatory, and two types of combination revolving and tilting reverberatory furnaces, to determine most suitable type of furnace for melting aluminum for sheet rolling. One giving best results was a combination revolving and tilting reverberatory units having capacity of 1000 lb. of aluminum. Describes melting practice employed with this furnace, and gives comparative data for all four units.

Economic Heating of. Economy of Heat in the Design and Operation of Metallurgical Furnaces (Erzielung hoher Wirtschaftlichkeit von Feuerungen), K. Huffelmann. Stahl u. Eisen, vol. 44, no. 47, Nov. 20, 1924, pp. 1488-1491. Discusses main conditions for economical heating of furnaces.

Electric. See ELECTRIC FURNACES, Metallurgical.

Fuel Economy in. See FUEL ECONOMY, Metallurgical Works.

High-Temperature. Tungsten Tube Furnace for Very High Temperatures (Wolframrohrofen für sehr hohe Temperaturen), W. Fehse. Zeit für technische Physik, vol. 5, no. 10, 1924, pp. 473-475, 3 figs. Design, construction and operation of an electric tube furnace for temperatures up to 3300 deg.

Oil-Fired Melting. Use Oil in Malleable Furnace, B. R. Mayne and C. Joseph. Foundry, vol. 52, no. 12, June 15, 1924, pp. 472-475, 5 figs. New method installed when costs become prohibitive; use same construction as was employed in coal-fired furnace; oil consumption considered low.

Operation. The Time Factor in Metallurgy. Chem. Age (Lond.), vol. 11, no. 286, Dec. 6, 1924, pp. 41-42. Comments on some recently published figures of average times for "fettling" and "charging" steel furnaces, giving figures applying to a particular works.

Producer-Gas-Fired. European Producer Practice, C. H. S. Tupholme. Blast Furnace & Steel Plant, vol. 12, no. 9, Sept. 1924, pp. 401-406, 11 figs. Why producer-gas-fired furnaces are popular in Europe. Describes some European furnaces and gives details of producer-gas plants employed for supplying furnaces.

Pulverized-Coal-Fired. Operation Tests of Pulverized-Coal-Fired Ingot Heating Furnaces (Betriebsuntersuchungen an kohlenstaubbeheizten Blockwärmöfen), A. Weyel. Stahl u. Eisen, vol. 44, no. 33, Aug. 14, 1924, pp. 977-979, 1 fig. Details of plant, results of tests, determination of temperature, draft and exhaust gas, efficiency and fuel consumption.

Waste-Gas Utilization. The Utilization of Exhaust Gas in Metallurgical Furnaces (Ueber Abgasausnutzung bei metallurgischen Oefen), O. Brandt. Giesserei-Zeitung, vol. 21, no. 3, Feb. 1, 1924, pp. 46-50, 5 figs. The use of exhaust gases for the production of hot air, hot water and steam through air heaters, water preheaters and waste boilers.

Zinc. Rôle of Carbonic Anhydride in the Gases of a Zinc Furnace (Du rôle de l'anhydride carbonique dans les gaz des fours à zinc), P. Pierron. Annales de l'Energie, vol. 4, no. 3, May-June 1924, pp. 86-93. Discusses equilibrium zinc oxide, carbon and gases derived from them, and carbonic anhydride hitherto neglected.

FURNACES, REVERBERATORY

Iron and Steel. Reverberatory Furnaces for Heating Iron and Steel, W. Mason. Metal Industry (Lond.), vol. 24, no. 8, Feb. 22, 1924, pp. 177-178, 4 figs. Chief practical details of design, control, and repair of ordinary reverberatory furnace, and principal faults in operation.

FURNACES, ROASTING

Types. Mechanical Roasting Furnaces (Ueber mechanische Röstöfen), B. Schapira. Feuerungstechnik, vol. 13, no. 6, Dec. 15, 1924, pp. 57-61, 8 figs. Design and operation of Humboldt, Herkules, Wagner, Lurgi, and other furnaces for roasting fine pyrites.

Zinc. A New Roasting Furnace for Zinc Flotation Concentrate, Chas. H. Fulton and J. Burns Read. Am. Inst. Min. & Met. Engrs.—Trans., no. 1362-D, Oct. 1924, 22 pp., 7 figs. Experiments carried on at Case School of Applied Science, together with their results; their success led to design of larger furnace herein described.

FURNITURE

Metal. See METAL FURNITURE.

Steel, Manufacture of. Manufacturing Welded Steel Bedroom Furniture. Acetylene Jl., vol. 25, no. 9, Mar. 1924, pp. 429-432, 6 figs. Manufacture of bedroom furniture at plant of Simmons Co., Kenosha, Wis.; importance of oxy-acetylene process for welding and brazing.

FURS

Identification. Identification of Furs, Microscopic Study of Animal Coats (L'identification des fourrures, étude microscopique des poils), C. Genot. Chimie & Industrie, vol. 12, no. 1, July 1924, pp. 31-48, 34 figs. Discusses means for distinguishing furs from imitations, microscopic examination of coat of principal fur animals.

FUSAIN. See COAL, Fusain, Analyses of.

FUSES

Electric. See ELECTRIC FUSES.

G

GAGES

[See also MEASURING INSTRUMENTS; Length; Precision.]

Angle. See Sine-Bar.

Checking System. Systematic Gage-Checking as a Requisite of Precise Measurement, Jos. Lannen. Soc. Automotive Engrs.—Jl., vol. 14, no. 4, Apr. 1924, pp. 407-408. Methods employed in creating and maintaining gage-checking system, and statement in reference to equipment used and good results attained.

Construction. Application of Interference of Light in the Construction of Gages (Die Anwendung der Interferenz des Lichtes im Lehrenbau), G. Berndt. Deutsche Optische Wochenschrift, vol. 10, nos. 22 and 23, June 1 and 8, 1924, pp. 265-269, and 282-285, 12 figs. Discusses use of light waves as constant length measure and application of its property of interference for testing accuracy of gages; particulars of Kösters interferometer.

End Bars and Slip. End Measuring-bars and Slip Gauges, A. J. C. Brookes. Machy. (Lond.),

vol. 25, no. 634, Nov. 20, 1924, pp. 244-249, 3 figs. How to check them; recommendations.

Hydrostatic. How to Compensate for Temperature Effects on Hydrostatic Gages, J. P. Nikonow. Automotive Industries, vol. 50, no. 18, May 1, 1924, pp. 964-966, 3 figs. Fluctuations in atmospheric temperature change volume of entrapped air and thus vary readings; practical method of balancing this factor is worked out.

Inspection. See MEASURING INSTRUMENTS, Precision.

Micro. See MACHINERY, Manufacture, Size Control in.

Micrometers. See MICROMETERS.

Optical. Hilger Optical Gauges. Engineering, 137, no. 3027, Jan. 4, 1924, p. 10, 3 figs. Designed during war for testing cylindrical tubes of eyepieces of telescopes which are made in standard dimensions.

Ordnance-Dept. Problems. Gage Problems of the Ordnance Department, C. C. Williams. Am. Mach., vol. 60, no. 22, May 29, 1924, pp. 791-793, 1 fig. Safeguarding gages on hand; studying allowances and tolerances; multiplicity of gages needed.

Precision Measurement with. Fine Measurement, J. E. Sears. Machy. (Lond.), vol. 24, nos. 607, 609, and 610, May 15, 29, and June 5, 1924, pp. 209-212, 266-271, and 299-303, 22 figs. Deals with precision measurement in its relation to mechanical work; methods by which control of standard gages is effected in laboratory; recent development in methods of precision measurement.

Pressure. A Study of Pfund's Pressure Gage, R. T. Cox. Optical Soc. Am.—Jl., vol. 9, no. 5, Nov. 1924, pp. 569-582, 4 figs. Details of experiments made with Pfund's combination of McLeod and Pirani pressure gages with a number of gases.

Modern Recording Pressure Gauges. Eng. Progress, vol. 5, no. 2, Feb. 1924, pp. 26-27, 4 figs. Design of recording instruments which permit control of constancy of pressure by means of graph produced by apparatus during certain interval of time.

The Theory of A Bourdon Tube Pressure Gauge and An Improvement in Its Mechanism, C. Sunatani. Tôhoku Imperial Univ.—Technology Reports, vol. 4, no. 2, 1924, pp. 19-60, 20 figs. Considers that displacement of free end of Bourdon tube should be proportional to pressure in tube and be very nearly a straight line motion, and proves this mathematically and experimentally; offers simple formula for determination of direction of displacement; strength of a Bourdon tube.

Sine-Bar. A Sine-bar Angle Gauge for Commutator Work, Wm. Crosier. Machy. (Lond.), vol. 23, no. 598, Mar. 13, 1924, pp. 767-768, 5 figs. Sine-bar angle gage designed by author for motor commutators.

The Sine Bar as a Universal Planing Gage, R. H. Rausch. Mech. Eng., vol. 46, no. 6, June 1924, pp. 345-348, 15 figs. Details of accurate system of gaging for use where large pieces are machined at comparatively long intervals; use of sine bar as templet for setting planer head and tools; formulas.

Special. Special Gages (Sonderlehren), E. Schuchardt. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 240-244, 32 figs. Points out that in addition to standard gages for standard parts as accepted by German Industrial Standards Committee, there are special gages for special parts; author seeks to develop standard guides for special gages adhering strictly to gage system.

Steels for. Progress of Gage Steel Investigation. Am. Mach., vol. 61, no. 16, Oct. 16, 1924, pp. 607-608. Abstract of progress report on service-wear and lapping-wear tests for gage steels, conducted by Gage Steel Committee of Bur. of Standards.

Research Reveals Properties of Steels Used for Gages. Automotive Industries, vol. 50, no. 14, Apr. 3, 1924, pp. 759-760. Investigations carried on at Bur. of Standards throw light on wear characteristics of different steels, hardened and unhardened; relative changes in size on hardening in oil and water; factors which affect time changes in gages.

Types. Standard Gages for Inside and Outside Diameters (Günstigste Lage der Stützpunkte bei Zeigerlehren für Innen- und Aussendurchmesser-Messungen), M. Bartholdy. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1023-1025, 9 figs. Notes on various types of machine-shop gages.

GALVANIZING

Electrogalvanizing. The Electro-Galvanising of Sheets, S. Cowper-Coles. Metal Industry (Lond.), vol. 25, no. 17, Oct. 24, 1924, pp. 393-394, 5 figs. Points out why electrogalvanized sheets do not compete seriously with hot galvanized sheets; accounts of certain processes of electrogalvanizing sheets, with desiderata for success.

Fluxing. A Study of Fluxing in Galvanising, H. Bablik. Metal Industry (Lond.), vol. 24, no. 23, June 6, 1924, pp. 541-543. Author describes tests carried out to determine mechanism of salammoniac as a fluxing agent, from which he draws conclusions to guide in efficient control of a galvanizing bath.

Hot, Weight of Coating in. Factors Influencing Weight of Galvanised Coatings, H. Bablik. Metal Industry (Lond.), vol. 25, no. 5, Aug. 1, 1924, pp. 97-99. Gives results of some tests carried out to determine influence of various factors, such as bath temperature, time of immersion, sheet thickness, bath composition and class of material galvanized, on weight of zinc coating obtained in hot galvanizing.

Kettles. Varying Behavior of Kettles for Galvanizing (Ueber das verschiedentliche Verhalten der Verzinnungskessel), B. Haas. Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 22, May 31, 1924, pp. 61-62 (Metall). Discusses attack of kettles by tin bath and fire, effect of tin oxide, etc.

Processes. Galvanizing Process (Das "Neuverzinken"), H. Bablik. Stahl u. Eisen, vol. 44, no. 9, Feb. 28, 1924, pp. 223-225, 1 fig. Process which originated in Czechoslovakia and is now extensively employed in Austria; iron is dipped in liquid zinc, and resulting coatings consist of several layers of zinc of different composition; advantages; cost figures.

The Story of Galvanizing Products, F. R. Otte. Sheet Metal Worker, vol. 15, no. 4, Mar. 14, 1924, pp. 109-113, 3 figs. Equipment, materials and processes employed in coating sheet metal ware, as well as other metal products.

Sheet Iron. Quantity of Zinc Absorbed in Hot Zincing (Die Höhe der Zinkaufnahme beim Feuerverzinken), H. Bablik. Stahl u. Eisen, vol. 44, no. 44, Oct. 30, 1924, pp. 1370-1371. Discusses tests to determine effect of time of dipping, temperature of zinc bath, thickness of sheet iron, chemical composition of zinc bath, and kind of iron to be coated on zinc absorption.

Sherardizing. See SHERARDIZING.

Testing Galvanized Iron. Methods of Testing Galvanized Iron, S. Cowper-Coles. Engineering, vol. 118, no. 3077, Dec. 19, 1924, p. 825, 1 fig. Brief discussion of test methods and apparatus.

Wire. Galvanizing (Étude sur la Galvanisation), A. Knepper. Usine, vol. 33, no. 24, June 14, 1924, pp. 19-23, 2 figs. Discusses thickness of zinc coat for hot galvanizing and exposure to

weather; hot galvanizing and interior use; electrolytic galvanizing and exposure to weather; and electrolytic galvanizing for interior use. Develops formulas for calculation.

Improved Process for Galvanizing Wire, J. L. Schueler. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 580-581. Describes process invented by J. L. Herman, consisting essentially in heat treating coating immediately after leaving spelter bath and without wiping.

Zinc-Coating Testing Method. The Preece Test for Zinc Coated Materials, W. M. Peirce. Iron Age, vol. 114, no. 4, July 24, 1924, pp. 199-201, 2 figs. Recent investigation shows its unreliability as to weight of zinc. Stripping and weighing test held to be most reliable index of quality.

GALVANOMETERS

Ballistic. On Methods of Varying the Sensitiveness of Ballistic Galvanometers, M. Masius. Physical Rev., vol. 23, no. 5, May 1924, pp. 649-654. Methods of changing sensitivity of ballistic galvanometers in a definite ratio by adding series resistance.

Einthoven. The Einthoven String Galvanometer, A Theoretical and Experimental Study, H. B. Williams. Optical Soc. of America—Jl., vol. 9, no. 2, Aug. 1924, pp. 129-174, 6 figs. Discusses mathematical theory, including steady continuous current, equilibrium, equations of motion, partial vibrations of string, etc.

Sensitivity Regulator for Vibration. A Sensitivity Regulator for Zero Instruments (Vibration Galvanometers) (Ein Empfindlichkeitsregler für Nullinstrumente), H. Schering and G. Reichardt. Archiv für Elektrotechnik, vol. 12, no. 6-12, Feb. 29, 1924, pp. 493-497, 2 figs. Describes new method and instrument for measurement of a.c. bridge.

Zeiss. A New Galvanometer (Ein neues Galvanometer), W. Villiger. Praktische Maschinen-Konstrukteur, vol. 57, no. 42, Nov. 4, 1924, pp. 571-572, 6 figs. Design and construction of a galvanometer entirely insensible to concussion and giving extremely accurate measurements.

GARAGES

CO Poisoning in. See CARBON MONOXIDE, Poisoning.

Construction. New Large-Scale Garage (Eine neue Massengarage), H. Luckhardt. Motorwagen, vol. 27, no. 23, Aug. 20, 1924, pp. 411-413, 6 figs. Details of patented arrangement in which stalls are placed at angle of 45 deg. instead of 90 deg., giving greater accommodation.

Problem of Garage Construction (Das Problem des Kraftwagenhauses), F. Pistor. Wirtschaftsmotor, vol. 6, no. 7-8, Aug. 25, 1924, pp. 1-6, 6 figs. Details of Pistor system of construction in which garage is a multiple-story roundhouse with drive-in-car stall and drive-out in a continuous curve; no elevators.

Germany. Large-Scale Garage Buildings (Das Gross-Garagenhaus). Automobil-Rundschau, vol. 23, no. 7, July 1, 1924, pp. 91-93, 3 figs. Combination of garage, workshops, and hotel, with capacity of over 1000 automobiles, using individual driveway for each floor as more expeditious than elevators.

GARBAGE DISPOSAL

England. Up-To-Date Refuse Collection. Motor Transport (Lond.), vol. 39, no. 1010, July 7, 1924, pp. 37-39, 5 figs. Recent experiences illustrating time, money, and labor saving possibilities of modern motor-transport equipment.

Indianapolis, Ind. Indianapolis Developments in Garbage Reduction, E. W. McCullough. Mun. & County Eng., vol. 66, no. 3, Mar. 1924, pp. 125-128. Also Eng. & Contracting (Water Works), vol. 62, no. 2, Aug. 13, 1924, pp. 357-359. Garbage dewatered in trailers used for collection; description of new garbage reduction plant; new tankage excellent for feeding.

Methods. New Process of Garbage Disposal at Lebanon, Pa., C. R. Fox and Wm. S. Davis. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, p. 857. After being ground in bone mill, material will be sent two miles through sewer to Imhoff tanks.

Notes on Garbage Disposal Methods in Pacific Coast Cities. Eng. News-Rec., vol. 93, no. 15, Oct. 9, 1924, pp. 591-592. Résumé of methods used in San Francisco, Sacramento, Los Angeles, Spokane, Portland, and Seattle. Some sell garbage, others pay for disposal; fills, destructors and hog farms all in use.

Refuse and Garbage Disposal (Beitrag zur Kehricht- und Müllbeseitigung), A. Reich. Städtereinigung, vol. 16, nos. 5, 6, 13, and 14, Mar. 1, 15, July 1, and 15, 1924, pp. 34-38, 45-46, 104-107, and 113-114, 12 figs. Discussion of processes and plants. Describes incinerating plant in Altona, built according to Herbetz system; Uhde system for irregular refuse of considerable water content; and Dörr system. Types of furnaces.

The Disposal of Municipal Refuse, S. A. Greeley. Eng. & Contracting (Water Works), vol. 62, no. 4, Oct. 8, 1924, pp. 813-816. Reviews recent practice in dealing with garbage and rubbish, including how refuse is classified, garbage reduction, Cobwell process, hog feeding, disposal by incineration, Beccari process, and comparison of methods.

Statistics. Garbage Collection Statistics. Pub. Wks., vol. 55, no. 12, Dec. 1924, pp. 380-383. Compiled from information furnished by officials of 200 cities.

GARNET

Mining and Concentrating. Mining, Concentrating, and Marketing Garnet, F. E. Wormser. Eng. & Min. Jl.-Press, vol. 118, no. 14, Oct. 4, 1924, pp. 525-531, 14 figs. Operations of North River Garnet Co. in Adirondack Mountains, largest producer in world.

GAS

Acetylene. See ACETYLENE.

Analysis. See GAS ANALYSIS.

Benzol-Content Determination. Determining the Benzol Content of Gas by Means of Activated Charcoal, A. Schmolke. Gas Engr., vol. 40, no. 582, Oct. 1924, pp. 219-220. Particulars of method employed by German chemists. From Gas u. Wasserfach.

Blast-Furnace. See BLAST-FURNACE GAS.

Burners. See GAS BURNERS.

Census of Manufactures. Manufactured Gas. U. S. Bur. Census, 1924, 35 pp. Census of manufactures, covering operations of manufacturing establishments during 1921.

Cleaning. See GAS CLEANING.

Coal. See COAL GAS.

Coke. See COKE, Sandwich Firing System.

Coke-Oven. See COKE-OVEN GAS.

Consumption, Effects of Inerts on. The Influence of Inerts in the Practical Uses of Gas, W. Bertelsmann. Gas Jl., vol. 168, no. 3212, Dec. 3, 1924, pp. 643-644. Details of tests made to determine practical effects of inerts on everyday gas consumption. Extracts from paper in Gas u. Wasserfach, Oct. 11, 1924.

Distribution. See GAS DISTRIBUTION.

Engines. See GAS ENGINES.

Fuel. Rational Use of Gaseous Fuels (Utilisation rationnelle des combustible gazeux), L. Fourmanoir. Arts et Métiers, vol. 77, no. 48, July 1924, pp. 241-251, 14 figs. Discusses combustion and its temperature, ignition and propagation, calorific power, burners and their requirements, industrial applications in various types of furnaces.

Gases. See GASES.

Heating-Value Computations. Gas Calorific Value Computations, W. A. Tookey. Gas Wld., vol. 81, no. 2093, Aug. 30, 1924, pp. 297-299. Gives tables for fundamental values for heats of combustion, combustion values of constituent gases; discusses net and gross calorific values, gas-engine mixture and Tookey factor.

Heating with. See HEATING, GAS.

Incombustible Ingredients, Effect of. Influence of Incombustible Ingredients on Practical Use of Illuminating Gas (Ueber den Einfluss der unverbrennlichen Bestandteile auf die praktische Brauchbarkeit des Leuchtgases), w. Bertelsmann and E. Ott. Gas- u. Wasserfach, vol. 67, nos. 41 and 43, Oct. 11 and 25, 1924, pp. 609-612 and 641-642. Results of tests with various pure and mixed gases to determine effect of incombustible matter on lighting and heating efficiency. Discusses Swiss standpoint as compared with German.

Industrial. New Methods of Producing Gas for Industrial Operations, R. Maclaurin. Ceramic Soc.—Trans., vol. 23, part 2, 1923-1924, pp. 121-144, 5 figs. Discusses chemical reactions in making gas; (1) heating bituminous coal to above 400 deg. cent. in absence of oxygen; (2) reaction of air with heated carbon, Siemens producer gas; (3) steam contacting with highly heated carbon, water gas reaction, and their combinations.

Manufacture. See GAS MANUFACTURE.

Meters. See GAS METERS.

Mixed Natural and Artificial. Natural to Manufactured Gas, F. L. Pringle. Gas Industry, vol. 18, no. 6, June 1924, pp. 203-208. States that there are two ways of dealing with rapidly diminishing supply of natural gas in United States, viz., abandonment of natural gas supply or conservation of remaining natural gas for mixing with artificial gas.

Mixtures, Organic Vapors in. Determination of Organic Vapors in Gas Mixtures, Especially Benzol in Coal Gas or Coke-Oven Gas, by Means of Active Charcoal (Die Bestimmung organischer Dampfe in Gasgemischen mittels aktiver Kohle, insbesondere die Benzolbestimmung in Leucht- oder Kokereigas), F. Fischer and C. Zerbe. Zeit. für angewandte Chemie, vol. 37, no. 28, July 10, 1924, p. 483. Authors give explanation which accounts for irregularities previously observed and not found by Berl and Wachendorff.

Natural. See NATURAL GAS.

Producer. See PRODUCER GAS.

Producers. See GAS PRODUCERS.

Purification. See PRECIPITATION, Electrical.

Quality. Effect of Variation in Quality on Use of Gas, L. W. Ready. Gas Age-Rec., vol. 53, no. 14, Apr. 5, 1924, pp. 419-421. Results of tests made under various conditions and with various standards in California.

Rate Making. Valuation for Rate Making, J. A. Emery. Gas Industry, vol. 18, no. 6, June 1924, pp. 195-199. Presents from engineering angle problems involved in valuation for rate-making purposes.

Reforming Process. Reformed Gas in Southern California Plants, H. L. Masser. Gas Age-Rec., vol. 54, no. 5, Aug. 2, 1924, pp. 143-146, 4 figs. Details on cracking of ethane.

Sulphur Compounds Removal. The Removal of Sulphur Compounds from Gas. Gas Engr., vol. 40, no. 582, Oct. 1924, pp. 212-213. Outlines some of the more recent processes which have been successful, including Koppers' liquid purification system.

Testing. General Notification of the Gas Referees. Gas World, vol. 80, no. 2060, Jan. 12, 1924, pp. 26-28. Provisions, as revised to Dec. 1923, covering recording calorimeters, testing place and access thereto, times of testing, representation of undertakings at testings, testing pressure of gas, and testing for calorific value.

Thermal Quality and Value. Relations of Thermal Quality to Value of Fuel Gases, C. F. Carrier. Chem. & Met. Eng., vol. 31, no. 17, Oct. 27, 1924, pp. 656-657. When used in efficient appliances value per B.t.u. is practically independent of kind of gas burned.

Use as Fuel. When Can Industry Afford to Use Gas as a Fuel? A. Duckham. Chem. & Met. Eng., vol. 31, no. 11, Sept. 15, 1924, pp. 417-418. A consideration of cost of raw coal and of manufactured gas with relation to their use in industry. Abstract from paper read at World Power Conference, Lond.

Vacuum Cleaning Machines, Use for. A New Use for Gas, B. C. Joy. Gas Jl., vol. 166, no. 3184, May 21, 1924, pp. 535-536. Possibilities of its employment for vacuum cleaning.

Water. See WATER GAS.

GAS ANALYSIS

Bone-Wheeler Apparatus. The Bone-Wheeler Gas Analysis Apparatus, C. S. W. Grice and W. Payman. Fuel, vol. 3, no. 7, July 1924, pp. 236-249, 7 figs. Describes apparatus and gives details of analysis of certain typical gaseous mixtures.

Burette for. Gas Analysis (Beitrag zur Gasanalyse), W. Moldenhauer. Zeit. für angewandte Chemie, vol. 37, no. 26, June 23, 1924, pp. 424-425, 3 figs. Describes gas burette which carries two short capillary tubes and is so bored that communication can be established between these or between one of the tubes and interior of burette.

Hydrogen and Methane in Producer Gas. Gas Analysis, H. Nielsen. Fuel, vol. 3, no. 6, June 1924, pp. 204-205, 1 fig. Determination of hydrogen and methane in producer gas.

Micro-Analysis. A New Method of Micro-gas Analysis, L. Reeve. Chem. Soc.—Jl., vol. 125 Sept. 1924, pp. 1946-1956, 1 fig. Account of methods adopted for measurement and analysis of gas mixtures consisting of CO_2, CO, hydrogen, and formaldehyde; suggests method for direct analysis of any oxygen present.

Morin Apparatus. An Automatic Gas Sampler Consisting of Reversed Flasks (Note sur un appareil autocapteur de gaz à flacons renverses), A. Dessemond. Revue de l'Industrie Minérale, no. 94, Nov. 15, 1924, pp. 533-538, 1 fig. Describes Morin apparatus based on principle of flasks in reversed position filled with water gradually emptying, gas taking place of water.

Orsat Apparatus. The Technical Analysis of High-Quality Gases with the Orsat Apparatus (Die technische Analyse von hochwertigen Gasen mit dem Orsatapparat), W. Stöckmann. Stahl u. Eisen, vol. 44, no. 6, Feb. 7, 1924, pp. 153-154. Describes method for joint combustion of methane and hydrogen with pure oxygen.

Thermal-Conductivity Method. Rapid Analysis of Gases. Chem. Age (N. Y.), vol. 32, no. 1, Jan. 1924, pp. 34-35, 2 figs. Notes on thermal-conductivity method of analysis, and description of gas analyser.

GAS APPLIANCES

Cookers. Standard Method of Testing Gas Cookers. Gas Jl., vol. 167, no. 3190, July 2, 1924, pp. 130-148, 13 figs. See also Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 651-664, 7 figs. Thirteenth (special) report of Gas Investigation Committee. Concludes that tests to ascertain information should be carried out on cooker-ovens: Normal maximum consumption, factor of safety, temperature-maintenance consumption and suitability for cooking.

Design. The Design of Gas Appliances, K. Bunte. Am. Gas. Jl., vol. 121, no. 26, Nov. 29, 1924, pp. 1221-1222 and 1235-1236. Principles upon which efficient gas appliances should be designed. Abstracted translation from Gas u. Wasserfach.

Germany. Experiences With Gas Consuming Apparatus (Ueber Erfahrungen an Gasverbrauchsapparaten), A. Köhl. Gas- u. Wasserfach, vol. 67, no. 37, Sept. 13, 1924, pp. 545-550, 17 figs. Discusses burner construction for gas mantles, cooking, etc.; damages to meters and gas apparatus found in Munich residences and factories; describes various effects of war regulations.

GAS BURNERS

Aeration and Injection. Aeration and Air Injection. Gas Jl., vol. 167, no. 3190, July 2, 1924, pp. 91-105, 15 figs. See also Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 621-633, 12 figs. Eleventh report of Research Sub-Committee of Gas Investigation Committee of Instn. Gas Engrs. Examination made of aeration accompanying use of gas in several typical burners, ring burners and those of gas-fire, aeration of burners, including principal data regarding burners for tests, effects upon aeration when burners are lighted, experiments with hot burners, pressures in burner bodies, aeration tests with gas-fire and specific gravity of gases.

GAS CLEANING

[See also GAS MANUFACTURE, Tar Removal.]

Blast-Furnace Gas. See BLAST-FURNACE GAS, Cleaning.

Electrical. Electric Gas Filters (Elektrofilter-Gasreinigung), C. Hahn. Siemens-Zeit., vol. 4, no. 1, Jan. 1924, pp. 6-14, 6 figs. Discusses use of dust precipitation by high-voltage current; system seems to adapt itself to any kind of dust, regardless of chemical nature; carbon, cement, blast-furnace gas, dust from tumbling barrels, all are precipitated by static action of direct current; electrodes may be made of iron for dry gas, galvanized for wet gases and lead-coated for acid fumes; synchronous motor-driven mechanical rectifiers are recommended to change 50,000-volt to 100,000-volt alternating into direct current; on average 1½ kw. cleans 1 cu. in. of gases per sec.

Latest Results in Electric Gas Purification (Neuere Ergebnisse mit der elektrischen Gasreinigung), R. Durrer. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Hochofenausschuss), no. 65, May 10, 1924, 6 pp., 9 figs. Describes electric plant of Dillinger works constructed by Elektrische Gasreinigungs A. G. on basis of their own and Zschocke patents, showing effective operation.

GAS DISTRIBUTION

East Prussia. Central Gas Supply in East Prussia (Ueber zentrale Gasversorgung in Ostpreussen), Kobbert. Gas- u. Wasserfach, vol. 67, no. 43, Oct. 25, 1924, pp. 642-646, 1 fig. Discusses long-distance gas supply for lighting and heating, competition with electric central stations, reduction of cost of production, and adjusting price of gas to operating conditions of customers.

High-and-Low Pressure. An Interesting Example of High-and-Low Pressure Gas Distribution, O. R. Allgeier. Compressed Air Mag., vol. 29, no. 10, Oct. 1924, pp. 1021-1024, 8 figs. Describes installation by St. Louis County Gas Co. of new water-gas and gas-compressing machinery; feature of plant is use of waste-heat boilers in conjunction with electric power.

Comparative Costs of H. P. and L. P. Gas Distribution, R. S. Fuller. Gas Age-Rec., vol. 54, no. 19, Nov. 8, 1924, pp. 665-670 and 674, 15 figs.

Long-Distance. Long-Distance Transmission of Gas (Transport du gaz à grande distance par refoulement), A. Grebel and H. Bouron. Technique Moderne, vol. 16, no. 5, Mar. 1, 1924, pp. 143-149, 11 figs. Calculation of size of pipe required for transmission of gas, and considerations determining extent to which compression should be affected; construction and relative merits of various types of pumps and compressors are compared, and typical layout for transmission station is illustrated; curves showing annual cost of transmission as function of pipe diam.; and trend of costs as function of increasing output during term of years.

Mains. See GAS MAINS.

Meters. See GAS METERS.

Patents. Gas Distribution. Abridgments of Specifications, (Lond.), Class 54, Period 1916-20, 38 pp. Patents for inventions, including gas holders, mains, pipes, meters, etc.

GAS ENGINES

Blast-Furnace Plant. New Gas-Engine Plant of the Illinois Steel Company. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 552-557, 7 figs. Plant contains four blast-furnace twin-tandem gas-engine units, each rated at 3300 kw., but with overload capacity exceeding 25 per cent; with these engines thermal efficiency increases with load; average economy maintained in practice approximates 24 per cent.

Combustion in. Combustion Process in Gas and Oil Engines (Der Verbrennungsvorgang in Gas- und Oelmaschinen), R. Schöttler. Wärme, vol. 47, nos. 35, 36, 37, 38, and 39, Aug. 29, Sept. 5, 12, 19, and 26, 1924, pp. 403-405, 416-420, 430-434, 442-445, and 455-456, 15 figs. Experiments by Otto, Deutz, Hopkinson, Meyer, etc.; carburetor oil engines; use of cooling water; tetralin and other fuels; hot-bulb engines; constant-pressure engines; process of combustion; flue-gas analysis.

Compression in. Experiments on Compression in Gas Engines (Etude expérimentale de la compression dans les moteurs à gaz), A. Jadot. Revue Universelle des Mines, vol. 4, nos. 2 and 3, Oct. 15 and Nov. 1, 1924, pp. 62-88 and 122-148, 20 figs. Discusses phenomena produced during period of compression, determining gas mixture in cylinder; measurement of leakages; research on law of variation of leakages; influence of leakages on final pressure of compression; effect of cylinder walls; theoretical laws of compression; investigation of law of compression by means of indicator diagrams; effect of compression on efficiency of engine; full-load and no-load compression.

Construction. Faulty Power Plants (Die kranke Kraftanlage). Kraft-maschine, vol. 21, nos. 12 and 13, June 25 and July 10, 1924, pp. 117-119 and 129-130, 21 figs. Discusses advanced ignition in 120-hp. engine, and arrangement of piston cooling for correction; describes various trial constructions and satisfactory solution:

cracks in cylinder heads and how to deal with them.

Crankshafts. See CRANKSHAFTS, Gas-Engine.

Exhaust-Gas Utilization. Waste Exhaust-Gas and Its Utilization, V. L. Maleev. Oil Engine Power, vol. 2, no. 1, Jan. 1924, pp. 18-20, 2 figs. Details of tests carried out in connection with 160-b.hp. gas engine in shops of West. Mach. Co., Los Angeles.

Farm. See FARM MACHINERY, Gas and Oil Engines.

Foundations. Foundations for Gas Engines. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 125-127, 8 figs. Design and construction of foundations suitable for internal-combustion engines, and particularly gas plants.

Fuel-Mixing Process in. Mixing Process in Gas and Oil Engines (Der Mischungsvorgang in Gas- und Oelmaschinen), R. Schöttler. Wärme, vol. 47, nos. 22, 23, 24, and 25, May 30, June 6, 13, and 20, 1924, pp. 249-254, 265-269, 277-280, and 292-293, 35 figs. Discusses process of combustion, mixing of gas and air in 2- and 4-stroke gas engines, excess air and optimum mixtures. Mixing of liquid fuel; carburetors; hot-bulb engines; Diesel engines; etc.

Germany. Large Gas Engines in German Power Economy, P. R. Meyer. Engineering, vol. 118, no. 3055, July 18, 1924, pp. 105-106, 2 figs; and (in German) in Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 52, Dec. 27, 1924, pp. 1336-1340, 13 figs. Types of two- and four-cycle gas engines used; total output and capacity; waste-heat recuperation; pressure hot cooling and evaporation cooling; financial economy of gas engines; fields of application.

Heat Loss in. Heat Loss in Gas Engines, W. T. David. Instn. Mech. Engrs.—Proc., no. 5, 1924, pp. 763-779 and (discussion) 779-821, 10 figs. and (abstract) in Engineering, vol. 118, no. 3070, Oct. 31, 1924, pp. 629-630, 10 figs. Results of series of measurements of radiation loss and of conduction loss during explosion and subsequent cooling of inflammable mixtures of coal gas and air contained in closed vessel; results emphasize marked influence of temperature on heat loss from working fluid both by conduction and radiation, and that radiation loss per unit area of wall surface increases greatly with cylinder dimensions.

Ignition. Ignition Equipment for a 7,500-H.P. Gas Engine. Engineering, vol. 117, no. 3039, Mar. 28, 1924, pp. 394-395, 4 figs. Set of equipment supplied by Lodge Bros. & Co. for gas engine; details of contact maker, igniter, timing unit and sparking plug.

See also IGNITION, Gas and Oil Engines.

Large. Large Gas Engines (Grossgasmaschinen), H. Dubbel. Praktische Maschinen-Konstrukteur, vol. 57, no. 35, Sept. 16, 1924, pp. 477-481, 15 figs. Review of present conditions of large gas engines, four-stroke and two-stroke.

Missing Pressure in. The Missing Pressure in Gas Engines, W. T. David. Instn. Mech. Engrs.—Proc., no. 5, 1924, pp. 741-762, 8 figs. and (discussion) 779-821, 6 figs.; also (abstract) in Engineering, vol. 118, no. 3070, Oct. 31, 1924, pp. 623-624, 7 figs.; and Engineer, vol. 138, no. 3592, Oct. 31, 1924, pp. 491-492. Discussion drawn from closed-vessel experiments in regard to causes responsible for missing pressure; estimated ideal pressures in closed vessel; application of results of closed-vessel experiments to gas engine; reason for low combustion factors realized in gas engines and effect of after-burning upon efficiency.

Performance. Gas-engine Performance, F. Johnstone-Taylor. Mech. Wld., vol. 75, no. 1941, Mar. 14, 1924, pp. 161-162, 1 fig. Importance of mixture strength, and method of estimation.

Starting and Starters. Gas Engine Starting and Starters, E. Pagett. Southern Engr., vol. 41, no. 3, May 1924, pp. 58-60, 7 figs. Explanation of various kinds of gas-engine starters and some of the difficulties encountered in starting an engine.

Steel Works. The Gas Engine in the Steel Industry, A. C. Danks. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 450-460 and (discussion) 460-462 and 501, 22 figs. First 4-cycle installation; methods of governing; effect of entering temperatures of gas and air; piston troubles and design; operating costs; engine tests, etc.

Temperature Distribution and Losses. Temperature Distribution and Losses during Combustion in Gas Engines (Die Temperaturverteilung sowie die Verluste während der Verbrennung bei Gasmotoren), Schmolke. Wärme, vol. 47, no. 15, Apr. 11, 1924, pp. 151-154, 1 fig. Method of determining temperature distribution in walls of Diesel engine under change of load, and explanation of heavy heat losses during combustion.

Tests. Gas-engine Trials, N. Harwood. Mech. World, vol. 75, no. 1935, Feb. 1, 1924, p. 65, 3 figs. Describes trials undertaken with object of investigating whether clearance space in a gas engine is wholly or partly filled every suction stroke.

Vertical. Browett-Lindley 150-H.P. Four-Cylinder Vertical as Engine. Engineering, vol. 118, n. 3077, Dec. 19, 1924, pp. 847-848, 3 figs. Example of gas engine working on 4-stroke cycle, which is of enclosed vertical type and has well-designed lubrication system.

Vertical Gas Engines (Les moteurs à gaz verticaux), J. Brunswick. Technique Moderne, vol. 16, no. 1, Jan. 1, 1924, pp. 7-10, 12 figs. Describes various types manufactured in different countries.

GAS HOLDERS

Capacity Measurement. Process for Testing Apparatus for Measuring Cubic Content (Ueber ein Verfahren zur Prüfung von Kubizierapparaten), W. Block and W. Dziobek. Gas- u. Wasserfach, vol. 67, no. 28, July 12, 1924, pp. 403-406. Describes new method for finding cubic content of gas holders by means of water instead of air, giving greater accuracy.

Corrosion. The Corrosion of Gasholders, C. A. Schnerr. Gas Engr., vol. 40, no. 577, May 1924, pp. 101-102. Causes of internal corrosion. Analysis of deposit.

Foundations. Foundations for Gas Holders, A. Hiley. Gas Engr., vol. 40, no. 582, Oct. 1924, pp. 214-216, 11 figs. Describes Vibro concrete pile foundations, as used for 78-ft. diameter piling recently completed for Aberystwyth Gas Co., Wales.

Oxy-Acetylene Welding. Gas Holder Seams Welded by Oxy-Acetylene Torch, G. O. Carter. Gas Age-Rec., vol. 53, no. 3, Jan. 19, 1924, pp. 69-72, 8 figs. Describes work on a 50,000 cu. ft. holder.

Spiral-Guided. Notes on a Spiral-Guided Holder and Ferro-Concrete Tank, L. R. Hislop. Gas Jl., vol. 166, no. 3178, Apr. 9, 1924, pp. 105-110 and (discussion) 110-111, 9 figs. See also Gas Wld., vol. 80, no. 2073, Apr. 12, 1924, pp. 328-333 and (discussion) 333-334, 9 figs. Description and construction data of 2¼ million cu. ft. capacity holder, and tank 172 ft. 6 in. inside diam. 28 ft. extreme depth below ground line, and 15 ft. above ground line, erected as part thereof, in Dundee, Scotland.

Spiral, Pressure on Roller Axles. Pressure on Roller Axles of Spirally Guided Gas holders, R. J. Milbourne. Gas Jl., vol. 165, no. 3174, Mar. 12, 1924, pp. 636-637, 5 figs. Points out that variable factors make it impossible entirely to determine stresses upon purely theoretical grounds, and calculated result must be qualified by special knowledge based upon observation and experience.

GAS INDUSTRY

France. Report of the Commission on Distribution (Rapport de la Commission de Distribution), C. d'Aubenton. Journal des Usines à Gaz., vol. 48, no. 17, Sept. 5, 1924, pp. 281-291, 9 figs. Reviews gas developments, especially in Paris.

GAS MAINS

Corrosion. Deposition and Corrosion in Gas Mains, H. Wynne. Gas Wld., vol. 80, no. 2075, Apr. 26, 1924, pp. 387-389. Napthalene deposits; remedies for naphthalene troubles; methods used at Burton-upon-Trent, Eng.; corrosion of mains and its prevention. Abstract of paper read before Midland Jr. Gas Assn.

Internal Corrosion and Deposits in Gas Mains, W. V. Watson. Gas Age-Rec., vol. 54, no. 16, Oct. 18, 1924, pp. 557-560, 4 figs. Extent of corrosion and deposits in San Diago, Cal., gas distribution system. Necessity of devising some method to reduce oxygen content to lowest possible limit and to eliminate last final traces of hydrogen sulphide in gas, the two impurities which appear to cause most damage to the system.

Soil Corrosion of Gas Distributing Systems, H. S. Christopher. Gas Age-Rec., vol. 54, no. 18, Nov. 1, 1924, pp. 633-638, 3 figs. Cause of corrosion and theories; various kinds of protection; paints containing oils unsuitable; steel pipe versus wrought-iron pipe.

Destruction by Lightning. Lightning Destroys a New 20-Inch Gas Main. Gas Age-Rec., vol. 54, no. 9, Aug. 30, 1924, pp. 289-291, 6 figs. Describes accidental breakage of large cast-iron main in Worcester, Mass.

Gas Temperatures in. Gas Temperatures in Long Underground Mains, F. M. Reiter. Gas Age-Rec., vol. 54, no. 8, Aug. 23, 1924, pp. 245-246, 1 fig. Data obtained from tests and observations on relative temperatures of gas and ground adjacent to main, and drops in temperature and pressure in large main for great distances.

Locating by Radio. Locating Gas Pipes by Radio, B. R. Carney. Gas Age-Rec., vol. 54, no. 23, Dec. 6, 1924, pp. 795-796 and 800, 6 figs. Principles of electric pipe finder and its use in locating old piping for which no records are available.

Natural-Gas, Louisiana-Texas. Constructing the World's Longest and Largest Welded Gas Main, Rob. G. Skerrett. Compressed Air Mag., vol. 29, no. 12, Dec. 1924, pp. 1089-1093, 14 figs. What is being done to draw natural gas from wells in Louisiana and to deliver it at point of consumption in Texas.

Rubber as Jointing Material. Further Experiences in Connection with Rubber as a Jointing Material for Gas-Mains, W. Hole. Gas Jl., vol. 166, no. 3189, June 25, 1924, pp. 899-901, 5 figs. Tests carried out to prove that suitably prepared rubber is practically immune from deleterious action by either coal gas or gaseous liquor.

Trenching Equipment. Trenching Machines are an Essential Equipment, A. G. Ford. Gas Age-Rec., vol. 54, no. 11, Sept. 13, 1924, pp. 359-362, 2 figs. Describes Barber Greene trenching machines which have been used for short and long main extensions, for uncovering pipe that it may be reclaimed, for digging services and for digging pipe line trench.

Welded Steel. Welded Steel Gas Main Data from Portland, Oregon, R. M. McCalley. Gas Age-Rec., vol. 54, nos. 13 and 14, Sept. 27 and Oct. 4, 1924, pp. 425-428 and 463-465, 15 figs. Results of author's experience; expansion and other stresses; heat treatment; methods used in installation of large-diameter lines; testing of joints.

GAS MANUFACTURE

Ammonia Concentrators, Operation. Operation of Ammonia Concentrators in Small Gas Plants, J. R. Wohrley Am. Gas Assn. Monthly, vol. 6, no. 3, Mar. 1924, pp. 185-191, 4 figs. Analytical survey of economic factors governing installation and operation of necessary equipment for profitable disposition of ammonia.

Ammonia Distillation, Spent Liquor Treatment. Treatment of Effluent Spent Liquors from the Distillation of Ammoniacal Liquor. Gas Jl., vol. 167, nos. 3192, 3194, and 3196, July 16, 30, and Aug. 13, 1924, pp. 324-325, 451-452, and 586-587, 6 figs. Gives results of experimental filter erected to test efficiency of coke packing under conditions varied with respect to rate of flow and strength of liquor feed. Discusses horizontal and vertical retort systems.

Backrun System. Backrun System at Worcester, E. H. Bauer. Gas Age-Rec., vol. 53, no. 7, Feb. 16, 1924, pp. 191-194 and 200. See also (abstract) Am. Gas Jl., vol. 120, no. 8, Feb. 23, 1924, pp. 177-181. Data from tests made from use of this type of apparatus; backrun proves profitable.

Benzol Recovery. See BENZOL, Recovery.

Carbon Monoxide Removal. The Removal of Carbon Monoxide from Water Gas and Coal Gas. Gas Engr., vol. 40, no. 579, July 1924, pp. 147-149. Discusses production of non-poisonous gas by elimination of CO; conversion of water gas to methane rich gas; replacement of CO in ordinary straight coal gas; results of experiments.

Clarification-Plant Sludge. Illuminating Gas From the Sludge of Clarification Plant (Leuchtgas aus dem Klärschlamm von Abwässer-Kläranlagen), G. Strassburger. Gesundheits-Ingenieur, vol. 47, no. 39, Sept. 27, 1924, pp. 453-454. Production of methane from sludge and artificial aiding of digesting process for the purpose.

Coal Carbonization. See COAL, Carbonization.

Coal-Coke Mixture as Generator Fuel. Coal-Coke Mixture for Generator Fuel, J. M. Williamson. Am. Gas Jl., vol. 121, no. 8, Aug. 23, 1924, pp. 769-770 and 785. Details of large-scale operations with the mixed fuel.

Coal Distillation. See COAL, Distillation.

Coke Gasification. See COKE, Gasification.

Corrosion Problems. Combating Corrosion in Gas Manufacture. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 47-50, 4 figs. Survey of problems of corrosion met with in gas-making industry. Paper is confined to industries where fuel gas is major product.

Developments. Recent Developments in the Artificial Gas Industry, F. W. Sperr, Jr. West. Soc. Engrs.—Jl., vol. 29, no. 8, Aug. 1924, pp. 327-338, 3 figs. Describes improvements for greater efficiency; discusses monster plants of high efficiency at mine mouth and pipe transmission of gas.

Different Grades. The Production of Different Grades of Gas. Gas Wld., vol. 81, no. 2094, Sept. 6, 1924, pp. 240-246. See also Gas Jl., vol. 167, no. 3200, Sept. 10, 1924, pp. 816-821. Discusses horizontal retorts, steaming in continuous vertical retorts, summary of results from steaming verti-

cals, precautions to be observed, flow of steam through nozzles, blue water gas, carbureted water gas, yields of different grades by different methods, complete gasification, distribution of different grades of gas, etc.

Double-Gas Process. Strache Double Gas Process for Complete Gasification, E. Blau. Gas Age-Rec., vol. 53, no. 5, Feb. 2, 1924, pp. 129-130 and 146, 2 figs. Complete gasification of coal in a single installation in which volatilization and gasification of residual coke both occur; description of generator for obtaining this double gas. Translated from German.

Gas-Oven Plant. Gas Oven Plant Erected at Utica, New York, J. E. Cooper. Gas Age-Rec., vol. 14, no. 15, Oct. 11, 1924, pp. 495-499, 8 figs. Plant consists of battery of 21 Koppers cross-regenerative combination coke and gas ovens, 3 Koppers producers together with complete by-product recovery apparatus, liquid purification and coal and coke-handling plants.

Gas Producers. The Production of Gas in the Generator, E. Terres and J. Schierenbeck. Am. Gas Jl., vol. 121, no. 29, Dec. 20, 1924, pp. 1285-1286 and 1297-1300, 4 figs Describes experimental work and results obtained in attempt to explain mechanism of gas process as it takes place in gas generator. Abstracted translation from Gas- u. Wasserfach.

Great Britain. Notes on Recent Developments of Gas Manufacture in Great Britain, T. Goulden. Gas Jl., vol. 167, no 3192, July 16, 1924, pp. 327-330. Calorific value basis; report of Fuel Research Board; Gas Regulation Act; vertical retorting; waste-heat boilers; fuel conservation in water-gas plants; complete gasification; low-temperature carbonization.

Iron Carbonyls in. Iron Carbonyls: Their Physical and Chemical Properties, A. C. Fieldner. Am. Gas Assn. Monthly, vol. 6, no. 7, July 1924, pp. 439-446. General discussion of metallic carbonyls, action of carbon monoxide on iron and presence and occurrence of iron carbonyls in gas-works practice. Bibliography. Pub. by permission U. S. Bur. Mines.

Naphthalene Removal. Naphthalene and Its Prevention, W. P. Lupton. Gas World, vol. 80, no. 2063, Feb. 2, 1924, pp. 84-87, 1 fig. See also Gas Jl., vol. 165, no. 3168, Jan. 30, 1924, pp. 262-265, 1 fig. Causes of naphthalene deposition; discusses methods for lowering naphthalene content of gas.

Producers. See GAS PRODUCERS.

Purification. The Purification of Gas, R. A. Weston. Gas Wld., vol. 81, no. 2100, Oct. 18, 1924, pp. 398-401 and (discussion) 401-402, 3 figs. See also Gas Jl., vol. 168, no. 3205, Oct. 15, 1924, pp. 169-172 and (discussion) 172-174, 4 figs. Reviews the various phases of purification process in light of recent experience with gas produced in vertical retorts (with 8 per cent of steaming) at Norwich, Eng., and also deals with methods of purification of gas from horizontal retorts at Norwich and elsewhere.

Retorts. Description of a New Horizontal Setting. Gas Jl., vol. 167, no. 3191, July 9, 1924, pp. 257-258, 1 fig. Describes plant of Robert Dempster & Son, Ltd., Elland, England; features make it unusually flexible and capable of meeting future contingencies in event of more widespread use of smokeless fuel.

Five Years Operation of a Vertical Retort Gas Plant, M. H. Frank. Gas Age-Rec., vol 54, nos. 11 and 12, Sept. 13 and 20, 1924, pp. 355-356 and 364, and 397-400, 10 figs. Gives outline and discusses results obtained from 5½ years' operation of vertical-retort gas plant comprised of two benches of nine retorts each operating under normal and abnormal conditions as experienced before, during, and after war period; describes plant and conditions under which it operates; gives details of operation and results which have been obtained. Abstract of paper read before Mich. Gas Assn.

Gas-Generating Retorts (Gaserzeugungsöfen), A. Wilhelm. Gas- u. Wasserfach, vol. 67, no. 14, Apr. 5, 1924, pp. 177-178. Choice of retort system for medium-sized and small works.

Gas-Generating Retorts (Gaserzeugungsöfen), K. Bunte. Gas- u. Wasserfach, vol 67, nos. 9 and 10, Mar. 1 and 8, 1924, pp. 101-103 and 119-121 and (discussion) 121-122. Agreements on form of guarantees; guarantee in percentage of heating value of coal.

Notes on the Working of the Glover-West Vertical Retorts at Foleshill Gas-Works, C. F. Tooby. Gas Jl., vol. 168, no. 3213, Dec. 10, 1924, pp. 715-719 (includes discussion), 7 figs. Working results of vertical retorts at Foleshill Gas Works, Coventry corporation, England. Results of tests on condensation. Gives charts and tables.

Refractory Materials and the Design of Retort Settings, V. E. Harston. Gas Wld., vol. 80, no. 2078, May 17, 1924, pp. 444-449 (includes discussion), 1 fig. See also Gas Jl., vol. 166, no. 3184, May 21, 1924, pp. 530-535, 5 figs. Behavior of different clays, requirements of a retort setting, design of settings, section of retort, constructional details of a retort bench, producers and generators, segmented retorts, etc.

Vertical Retorts at Clichy Gasworks, M. H. Laedlein. Gas Wld., vol. 81, no. 2090, Aug. 9, 1924, pp. 137-138, 1 fig. Discusses effects of steaming, yields of coke, tar and ammonia, fuel account, and firing by producer gas. Translated from paper read before Société Technique de l'Industrie du Gaz en France.

Tar Removal. The Removal of Tar from Gases by the Cottrell Electrical Precipitation Processes, N. W. Sultzer and C. W. Hedberg. Am. Gas Assn. Monthly, vol. 6, no. 12, Dec. 1924, pp. 759-766, 5 figs. Brief summary of commercial application of Cottrell processes, and discussion on use of Cottrell processes for removing tar and the less volatile oils from combustible gases.

Vertical Retorts. See BOILERS, Waste-Heat.

Water Gas. See WATER GAS, Manufacture.

GAS METERS

Carbonic-Acid Corrosion. The Influence of Carbonic Acid in Gas Meters (Die Wirkung der Kohlensäure im Gasmesser), W. Leybold. Gas- u. Wasserfach, vol. 67, no. 13, Mar. 29, 1924, pp. 168-170. Result of investigation of corrosion in a number of gas meters in a large German city; it seemed apparent that, under influence of the carbonic acid of the gas, the iron became detached from gas-meter plate.

Gummy Deposits. Gummy Deposits in Gas Meters, Ralph L. Brown. Am. Gas Jl. (daily edition), vol. 121, no. 17, Oct. 15, 1924, pp. 1012-1015. Report of various phases of investigation on occurrence, cause, and prevention.

Principles. Fundamental Principles of Gas Meters and Indicators (Principes fondamentaux des Compteurs et Indicateurs de Débits gazeux), A. Grebel. Chaleur & Industrie, vol. 5, no. 54, Oct. 1924, pp. 517-519, 7 figs. Discusses meters indicating and totalling gas flow, rotary and clock types. Shows that all are based on measurement of volume.

Sigma. The Sigma Gas Meter, M. Chamon. Gas Wld., vol. 81, no. 2090, Aug. 9, 1924, pp. 138-139, 4 figs. Describes new gas meter which uses metal in measuring parts and has constant level of liquid; liquid must be not water but some

non-oxidizing unfreezable oil such as would create lubricating atmosphere. Translated from paper read before Société Technique de l'Industrie du Gaz en France.

Thomas. The Thomas Gas Meter. Engineering, vol. 118, no. 3057, Aug. 1, 1924, pp. 182-183, 5 figs. Details of gas meter recording automatically in terms of cubic feet at standard pressure of 30 in. of mercury and saturated temperature of 60 deg. fahr., exhibited at Wembley Exposition by Cambridge Instrument Co., Lond., based on fact that specific heat for all gases occurring in practice is very nearly constant.

GAS PRODUCERS

British and American. Notes on Gas-Producer Practice, J. D. Troup. Iron & Coal Trades Rev., vol. 108, nos. 2929 and 2930, Apr. 18 and 25, 1924, pp. 631-632 and 678-679, 4 figs. British and American practice.

Coke. Experiments with Gas Producers (Untersuchungen an Koksgeneratoren), E. Terres and J. Schierenbeck. Gas-und Wasserfach, vol. 67, nos. 19, 20, 21, 22, and 23, May 10, 17. 24, 31 and June 7, 1924, pp. 257-263, 279-282, 296-299, 311-314, and 325-327, 11 figs. Discusses experiments carried out with gas producers to replace empirical data by exact experimental data and to study effect of constructional changes on processes under consideration. Discusses experimental arrangements, results with flat grates and inclined grates, composition of gas, etc.

Developments. Modern Developments in Gas-Producing Plant, F. H. Beebe. Gas Engr., vol. 40, no. 580, Aug. 1924, pp. 172-174, 5 figs. Discusses reduction of back pressure, shorter cycle operation, automatic chargers, fuel feed to generators, waste-heat boilers, and purification process.

Double-Grate. A New Method for Improvement of Gas Furnaces Directly Connected with Gas Producer (Ein neuer Weg zur Verbesserung der mit dem Generator in unmittelbarer Verbindung stehenden Gasfeuerungen), J. Hudler. Gas- u. Wasserfach, vol. 67, no. 2, Jan. 12, 1924, pp. 16-18, 2 figs. Describes patented double-grate producer which has a second combustion hearth directly over step grate, and points out its economic advantages.

Gasification in. Gasification of Fuels in Gas Producers (Die Generatorvergasung der Brennstoffe), H. Koschmieder. Brennstoff u. Wärmewirtschaft, vol. 6, nos. 8 and 9, Aug. and Sept. 1924, pp. 169-174 and 196-201, 2 figs. Discusses combustion process in gas producers, clinker, water gas, CO_2 gas, reactions, composition of products, heat balance, etc.; operating results obtained from a Rombach producer.

Large-Scale Power Generation, Application to. The Gas Producer as Applied to Large-Scale Power Generation, A. H. Lymn. Iron & Coal Trades Rev., vol. 109, no. 2941, July 11, 1924, pp. 58-59. Describes various methods of applying gas-producer plants to generation of power on large scale and shows economics of different systems as compared with each other and with most modern direct-fired steam practice. Abstract of paper read before World Power Conference.

Lignite-Briquet. Lignite-Briquette Producers (Braunkohlenbrikett-Generatoren), Motor u. Auto, vol. 21, no. 5, Mar. 10, 1924, pp. 38-39, 2 figs. Description of lignite suction-gas plant, consisting of generator, evaporator, scrubber, and gas-collecting vats.

Revolving-Grate Gas-Producer Plants Burning Lignite Briquets (Mit rheinischen Braunkohlenbriketts beschickte Drehrostgaserzeuger-Anlagen), H. Becker. Feuerungstechnik, vol. 12, no. 24, Sept. 15, 1924, pp. 203-210, 2 figs. Discusses lignite briquets, revolving grates, operation of gas producers, tar recovery and gas scrubbing. Results obtained with lignite briquet firing.

Operation. Gas Producer Operation (Ueber den Generatorbetrieb), H. Strache. Sparwirtschaft, no. 13-14, July 1924, pp. 61-64 (GW). Discusses temperature, CO_2 and CO content, ash removal, coal storage, mixed-fuel firing, primary tar production, etc.

Portable. A Portable Power Generator Using Gas Made From Local Fuel, S. D. Ware. Min. Mag., vol. 30, no. 5, May 1924, pp. 275-277, 3 figs. Describes new type of power generator specially useful in mining and transport abroad, having three features, viz., portability, low fuel costs, and low capital cost.

Practice. Gas Producer Practice, W. Dyrssen. Blast Furnace & Steel Plant, vol. 12, nos. 3 and 6, Mar. and June 1924, pp. 161-165 and 271-273, Mar.: Temperature of gas; blast temperature and steam consumption; use of oxygen in gas producers; influence of rate of gasification; instruments required for controlling and supervising operation of producers; preheating of blast; other cooling mediums than steam in producers. June: Savings possible by use of waste gases in place of steam for cooling fire zone; modern types of gas producers.

Pressure. Control of Pressure Gas Producers, W. P. Chandler, Jr. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 289-293 and (discussion) 293-299, 4 figs. For metallurgical furnaces in steel mills; discusses main factors influencing producer operation and means for obtaining greatest return for given size of gas producer and from coal charged.

Regulation. Tests on Regulation of Gas Producers and Open-Hearth Furnaces (Versuche zur Einregelung von Gaserzeuger und Siemens-Martin-Oefen), Geo. Bulle. Stahl u. Eisen, vol. 44, no. 15, Apr. 10, 1924, pp. 397-403, 6 figs. Summary of measurements carried out on 7 producer plants and 3 open-hearth works; determination of influence of varying steam consumption, load and treatment on producers; tests on open-hearth furnaces to ascertain correct quantity of air and best mixing conditions of coke-oven and producer gas; description of necessary measuring equipment.

Sawdust. Sawdust as a Fuel for Gas Production, H. Dormand. Power, vol. 59, no. 22, May 27, 1924, pp. 862-863, 2 figs. Design of suction-gas producer which will successfully gasify sawdust and like refuse, working automatically, without poking or interfering with combustion, producing good and clean power gases, without any dust or partly carbonized fuel being drawn off the gases.

Slagging. The Slagging Producer in Steel Works, K. Huessener. Iron & Steel Engr., vol. 1, nos. 9 and 10, Sept. and Oct. 1924, pp. 457-464 and 561-563 (discussion), 3 figs. History, description, uses, and advantages.

Suction. See FUELS, Factory Refuse.

Test Code for. Test Code for Gas Producers. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 910-915. Tentative draft of code in series of 19 being formulated by A. S. M. E. Committee on Power Test Codes.

Unburned Gases, Utilization. Using Unburned Gases of Coke-Oven Generators (Ausnutzung unverbrannter Gase von Einzelgeneratoren in Verkokungsöfen), E. W. Stürmer. Brennstoff- und Wärmewirtschaft, vol. 6, no. 10, Oct. 1924, pp. 212-215. Gives examples and cost data of adding water gas to coal gas by new patent process showing considerable economy, especially for smaller gas works.

GAS TURBINES

Automobiles. The Gas Turbine, Its Use for Automobiles and Airships (La turbine à gaz, son utilisation en automobilisme et en aéronautique). Technique Automobile et Aérienne, vol. 15, no. 125, 1924, pp. 33-37, 2 figs. Discusses their efficiency, variation of power, weight per hp.; cycles of constant-volume combustion and constant-pressure combustion; comparison with steam turbines.

Development. History of the Progress of Gas and Oil Turbines (Die Arbeit an der Gas- und Oelturbine), W. Gentsch. Brennstoff- und Wärmewirtschaft, vol. 6, nos. 2, 3, and 4, Feb., Mar., and Apr. 1924, pp. 28-35, 48-55, and 71-79, 18 figs. Various attempts to solve problem of economical internal-combustion turbine are recorded and described, including Brown, Boveri, Schneider, Westinghouse, Stodola, General Electric, Francke, Rateau, Nash Eng. Co., etc.

The Gas Turbine, F. Dollin. Instn. Mech. Engrs.—Proc., vol. 2, no. 6, 1923, pp. 1121-1135, 2 figs. Account of most noteworthy attempts to produce efficient and reliable gas turbine; summary of results obtained and indication of possible future developments. (Abridged.)

See also POWER, Development.

Holzwarth. Development of Gas and Oil Turbines. Iron Age, vol. 114, nos. 21 and 22, Nov. 20 and 27, 1924, pp. 1329-1333 and 1407-1409, 13 figs. Nov. 20: Use of intermittent impulses found to give results where continuous impulse method failed; unit developed by Holzwarth for steel-works use. Nov. 27: Test data showing efficiencies obtained; estimated capital and operation costs; study of charted efficiency curves.

The Holzwarth Gas Turbine. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 140-142, 6 figs. Chronicle of progress actually made with this design.

The Internal-Combustion Turbine (La turbine à combustion interne), A. Stouvenot and P. Troy. Nature (Paris), no. 2634, Sept. 27, 1924, pp. 203-206, 1 fig. Design and operation of a 5000-kw. Holzwarth turbine, with eight explosion chambers.

Problems of. The Gas Turbine, H. Campbell. Inst. Mar. Engrs.—Trans., vol. 35, Apr. 1924, pp. 684-694 and (discussion) 694-701, 5 figs. Review of what is known about gas turbines up to date. Difficulties which have been experienced in dealing with gas turbines both theoretically and practically. Points out that a new material has to be found to stand high temperatures.

Stauber. New Methods of Energy Generation—Stauber Gas Turbine, Löffler. Mech. Eng., vol. 46, no. 5, May 1924, pp. 284-285, 1 fig. Discusses various new paths sought and partly opened up in domain of power generation, and describes construction of Stauber turbine being experimentally operated by German Gen. Elec. Co. in Berlin. Translated from Zeit. des Vereines deutscher Ingenieure, Feb. 23, 1924, pp. 161-169.

Technical Aspects. Some Technical Aspects of the Internal-Combustion Turbine. Power Engr., vol. 19, no. 216, Mar. 1924, pp. 107-109, 1 fig. Survey of present knowledge and practice.

Waste-Heat-Recovery. Gas Turbines for Waste Heat Recovery. Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 96-98, 4 figs. German developments and their possible applications to conditions in Great Britain.

GAS WORKS

Coal-Gas Plant. Coal-Gas Plant at the Great Western Railway Works, Swindon. Engineering, vol. 117, nos. 3032, 3034, 3037, and 3040, Feb. 8, 22, Mar. 14, and Apr. 4, 1924, pp. 164-169, 228-229, 328-330, and 421-422, 92 figs. partly on supp. plates. Describes plant installed for supplying works with coal gas for lighting and for use in numerous gas-fired furnaces required for heat treatment of steel and other heating processes; consists of installation of continuous vertical retorts on Dempster-Toogood system.

Coke Handling. See COKE, Quenching; COKE HANDLING.

Electric Drive. Electric Drive in Gas Works (Elektrische Sonderantriebe in Gaswerken), R. Germershausen. Gas- u. Wasserfach, vol. 67, no. 36, Sept. 6, 1924, pp. 535-539, 6 figs. Regulations for electric drive in dangerous places; electric drive in condensation and tool shops; group drive of washers and other apparatus; application of d.c. and a.c. and their effect on choice of apparatus.

Experimental Coal-Gas Plant. Inauguration of Experimental Coal-Gas Plant at Leeds University, Gas Jl., vol. 166, no. 3177, Apr. 2, 1924, pp. 27-29, 8 figs. Describes plant designed for carbonization of coal on a scale greater than is possible in laboratory apparatus, and recovery and measurement of usual products.

Foundations. See CONCRETE CONSTRUCTION, REINFORCED, Gas Works.

France. 47th Congress of the Technical Society of the Gas Industry in France (International Congress, Paris, June 24-28, 1924) [47th Congrès de la Société Technique de l'Industrie du gaz en France (Congrès international, Paris, 24-28 juin 1924).] Génie Civil, vol. 85, nos. 2, 3, and 4, July 12, 19, and 26, 1924, pp. 39-43, 65-71, and 93-96, 36 figs. Details of vertical retort furnace for continuous distillation, Woodall-Duckham system, Sigma gas meter, Thomas gas meter, production of coal distillation by-products at Gennevilliers, research on phenol and cresol, gas generators, etc.

"La Villette" Works of the Société du Gaz de Paris. Gas. Jl., vol. 167, no. 3197, Aug. 20, 1924, pp. 639-641, 5 figs. Describes "La Villette" plant as group of works covering more than 81 acres in northeastern district of Paris; coal handling; chamber ovens; water gas; storage and distribution; power stations and experimental station.

Furnaces. Gas Works Furnaces (Gaserzeugungsöfen), M. Schallenberg. Gas- u. Wasserfach, vol. 67, no. 11, Mar. 15, 1924, pp. 133-136, 10 figs. Discusses furnaces for large gas works, process of cokification, fundamentals in selection of furnace system, low-temperature carbonization, etc.

Progress in the Field of Coal Gas Furnaces (Neuerungen auf dem Gebiete der Steinkohlen-Gaserzeugungsöfen), Glaubitz. Gas- u. Wasserfach, vol. 67, no. 36, Sept. 6, 1924, pp. 533-535. Development of furnaces for gas generation; selection of furnace; vertical chamber furnaces of 300,000 cu. m. daily capacity; furnace materials; describes Pintsch-Otto vertical furnace, its construction, operation and advantages of heating with central generators.

Gas Holders. See GAS HOLDERS.

Gennevilliers, France. Control of Inclined Chamber Benches at the Gennevilliers Gasworks, M. A. Bazille. Gas Wld., vol. 81, no. 2102, Nov. 1, 1924, pp. 448-450, 3 figs. Most modern inclined chamber benches are in use, with Siemens producers back to back, and Lachomette recuperators for heating secondary air.

Kiel, Germany. Peculiarities of the Kiel Gas Works as Coke Oven Plant (Eigentümlichkeiten des Kieler Gaswerks als Kokereibetrieb und des Kieler Tarifs), Elvers. Gas- u. Wasserfach, vol. 67, no. 46, Nov. 15, 1924, pp. 692-694, 3 figs. Discusses gas-works operations in which by-product recovery plays a large part; gas rates and their determination.

Landy, France. The Landy Works of the Société du Gaz de Paris. Gas Jl., vol. 166, no.

3188, June 18, 1924, pp. 836-839, 4 figs. Describes coal-handling plant, carbonization plant, central power station, liquor treatment and sulphate plant, etc.

Liverpool, England. The Construction of New Coal-Gas Works at Garston, R. E. Gibson. Gas Jl., vol. 167, no. 3190, July 2, 1924, pp. 170-179 and (discussion) 179-182, 15 figs. See also Gas Wld., vol. 80, no. 2084, June 28, 1924, pp. 693-702, 12 figs. Describes Garston Gas Works and deals with reasons for adoption of various kinds of plant and different forms of construction; gives particulars as to results obtained.

Lubrication. Some Notes on the Lubrication of Gas Works Plant, W. T. Kenshole. Gas. Jl., vol. 165, no. 3172, Feb. 27, 1924, pp. 490-491, 1 fig. Also Gas Engr., vol. 40, no. 575, Mar. 1924, pp. 51-52 and Gas World, vol. 80, no. 2067, Mar. 1, 1924, pp. 176-179. Discusses lubrication of engines and machinery.

Management. Economic Problems of Gas, Water and Electricity Works (Wirtschaftliche Aufgaben der Gas-, Wasser- und Elektrizitätswerke), M. Permien. Gas- u. Wasserfach, vol. 67, no. 42, Oct. 18, 1924, pp. 625-627. Lays stress on increased recovery of by-products of good quality; waste heat utilization; improved apparatus for gas consumption; etc.

Energy Supply for Municipal Gas, Water and Electricity Works (Beispiele für Formen der Energiebeschaffung bei Städt. Gas-, Wasser- und Elektrizitätswerken), G. Franke. Gas- u. Wasserfach, vol. 67, no. 49, Dec. 6, 1924, pp. 737-739, 1 fig. Describes operation of Delmenhorst gas, electricity and water works; manner of making best use of materials and of waste heat, without impairing independence of individual works.

Naphthalene Removal. See NAPHTHALENE, Washers.

Operation-Efficiency Measurement. Operation Efficiency Measurement in Coal Gas Works, C. H. Dahl. Gas Age-Rec., vol. 53, no. 8, Feb. 23, 1924, pp. 219-221. Example of evaluating operation efficiency through monthly records of weighted standard scores.

Plant Flexibility. Buffalo Plant for the Iroquois Corporation Described, J. S. DeHart, Jr. Gas Age-Rec., vol. 54, no. 9, Aug. 30, 1924, pp. 283-286, 5 figs. Describes operation of new plant of Isbell-Porter Co., Newark, N. J., consisting of a Woodall-Duckham coal gas installation and blue water gas plant, arranged to operate as one unit when necessary to completely gasify 250 tons of coal a day. Will have capacity for 2,500,000 cu. ft. straight coal gas of 580 B.t.u. per cu. ft., which may be increased by steaming retorts to 5,000,000 cu. ft. of 435 B.t.u. per cu. ft., and blue gas auxiliary plant will bring total capacity of plant to 10,000,000 cu. ft. of 365 B.t.u. per cu. ft. From paper read before Can. Gas Assn.

Refractories for. See REFRACTORIES, Gas-House.

Retorts. See GAS MANUFACTURE, Retorts.

Spark Formation in. See ELECTRIC SPARKS, Formation.

GASES

Absorption. Comparative Absorption Rates for Various Gases, W. G. Whitman and D. S. Davis. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1233-1236, 9 figs. Experimental study of absorption through free surface of liquid when liquid is stirred.

Effect of Gas Velocity and Temperature on Rate of Absorption, R. T. Haslam, R. L. Hershey and R. H. Keen. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1224-1230, 12 figs. Research conducted in effort to discover whether two-film theory of absorption of gas in liquid would quantitatively describe rate of absorption in given system under varying conditions.

Mechanism of Absorption of Moderately Soluble Gases in Water, H. G. Becker. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1220-1224, 4 figs. When liquid is mixed and when it is not mixed.

Principles of Gas Absorption, W. K. Lewis and W. G. Whitman. Indus. & Eng. Chem., vol. 16, no 12, Dec. 1924, pp. 1215-1220, 3 figs. Outlines certain of more fundamental conceptions developed from available data and from general laws of reactions between two phases. Bibliography.

See also LIQUIDS, Absorption of Gases by.

Analysis of, Thermal-Conductivity, Method for. Thermal-Conductivity Method for the Analysis of Gases, P. E. Palmer and E. R. Weaver. U. S. Bur. Standards—Technologic Papers no. 249, Jan. 7, 1924, 100 pp., 40 figs. By a comparison of resistance of two electrically-heated wires surrounded, respectively, by gas for analysis and a reference gas, a determination is possible of concentration of certain constituents in a wide variety of gas mixtures of importance in industry and research. Results of an investigation with this method.

Behavior in Contact with Glass Surfaces. The Behaviour of Gases in Contact with Glass Surfaces, D. H. Bangham and F. P. Burt. Roy. Soc. —Proc., vol. 105, no. A732, Apr. 1, 1924, pp. 481-488, 3 figs. Experiments with CO_2; table giving sorption values obtained at stated times; desorption experiment.

Brownian Movements in. Brownian Movements of the Same Particles under Different Gas Pressures (Die Brownsche Bewegung desselben Probekörpers bei verschiedenen Gasdrucken), S. Landman. Zeit. für Physik, vol. 27, no. 4, Sept. 12, 1924, pp. 237-247, 2 figs. Drops of oil between horizontal plates of a condenser were raised by application of electric field and permitted to fall while under observation through microscope; this could be done again and again and at same time pressure of gas could be changed, or even different gas substituted for first; it appears, therefore, that with diminishing pressure Brownian movements increase in liveliness.

Cathode Fall in Mixtures. Calculation of Normal Cathode Falls in Gas Mixtures (Die Berechnung des normalen Kathodenfalles in Gasgemischen), A. Günther-Schulze. Zeit. für Physik, vol. 21, no. 1, 1924, pp. 50-59, 6 figs. Attempt is made to calculate normal cathode fall in gas mixtures; table is given showing close accord between calculated and measured values of normal cathode fall in Hg-Ar mixtures, using graphite cathode; mixtures of rare gases with other gases are also considered; results are shown by series of graphs.

Chemical Combination. Recombination of Gaseous Ions, the Chemical Combination of Gases, and Monomolecular Reactions, J. J. Thomson. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 337-378, 2 figs. Results of investigations; expression is found for rate of combination of electron and positive ion; monomolecular reactions are regarded as due to accumulation of thermal energy in particular molecules until these have sufficient energy to dissociate or evaporate.

Cohesion Pressure. Cohesion Pressure (Betrachtungen über den Kohäsionsdruck), A. Brandt. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 415-425, 1 fig. Calculations based on Amagat's experimental data and Van der Waals' equation; it is suggested that CO_2 shows evidence of progressive association, as pressure is increased and temperature is lowered.

Combustion, Dewpoint Temperature of. The Dewpoint Temperature of Gases from Combustion,

J. N. Waite. Elec. Rev., vol. 94, nos. 2429 and 2430, June 13 and 20, 1924, pp. 954-956 and 994-996, 6 figs. Method of calculating dewpoint temperature for gases resulting for a given fuel, fuel taken being a medium grade bituminous coal having a medium hydrogen and moisture content. Effect of change of fuel analysis on dewpoint temperature of resultant gases of combustion. Curves and tables.

Combustion at High Pressure. Gaseous Combustion at High Pressures, Wm. A. Bone, D. M. Newitt and D. T. A. Townend. Roy. Soc.—Proc., vol. 105, no. A732, Apr. 1, 1924, pp. 406-433, 6 figs. Influence of varying initial pressures upon rate of pressure development and activation of nitrogen in carbon monoxide-air explosions.

Combustion of. The Combustion of Gases [Die Verbrennung von gasförmigen Brennstoffen (Generatorgas)], A. Dosch. Sprechsaal, vol. 57, nos. 14, 15, and 16, Apr. 3, 14, and 17, 1924, pp. 147-149, 157-159, and 171-173, 5 figs. Processes of combustion of various gases analyzed and explained. Quantities of air required for combustion of various gas mixtures computed and illustrated with aid of several examples.

Committee Report. Report of the Committee on Gases, H. E. Newell. Safety Eng., vol. 48, no. 1, July 1924, pp. 32-38. Including emergency gas shut-off valves, acetylene equipment, refrigeration equipment, gas systems for house lighting and cooking and internal combustion engines.

Compressibility to High Pressures. The Compressibility of Five Gases to High Pressures, P. W. Bridgman. Am. Acad. Arts & Sciences—Proc., vol. 59, no. 8, Jan. 1924, pp. 173-211, 5 figs. Results of measurements of compressibility of hydrogen, helium, ammonia, nitrogen, and argon, to pressures varying from 12,000 to 15,000 kg. per. sq. cm. References.

Critical Constants. A Review of the Critical Constants of Various Gases, S. F. Pickering. Jl. Physical Chem., vol. 28, no. 2, Feb. 1924, pp. 97-124. Review of literature on the subject, in which an attempt has been made to include all available data on the more common gases and, as far as possible, to select what appear to be best values.

Critical Pressure Ratio. The Critical Pressure-Ratio for Gases as affected by Variable Specific Heat. W. J. Walker. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 286, Oct. 1924, pp. 703-707, 1 fig. Critical pressure ratio determining maximum discharge conditions under variable specific-heat conditions is deduced.

Cylinders, Safe Handling of. Rules for the Safe Handling of Gas Cylinders. Am. Mach., vol. 60, no. 12, Mar. 20, 1924, p. 424. Rules prepared by Gas Products Assn., Chicago, for handling of cylinders containing compressed oxygen, hydrogen, and acetylene.

Density Determination. Determination of the Density of a Gas (Zur Bestimmung der Gasdichte), F. Politzer. Zeit. für angewandte Chemie, vol. 37, no. 27, June 25, 1924, pp. 459-461, 3 figs. Describes method which depends on direct manometric weighing of column of gas and which is particularly rapid and accurate for technical use; details and operation of apparatus.

See also INTERFEROMETERS, Measurement of Density of Gases.

Diffusion. Gaseous Diffusion. Sci. & Art of Min., vol. 34, no. 19, Mar. 29, 1924, pp. 276-277, 1 fig. Discusses phenomenon of diffusion, important because diffusion of mine gases into air-current, and vice versa, is continually taking place.

Dust Removal. Separating Dust from Gases with Dust, Geo. B. Cramp. Chem. & Met. Eng., vol. 30, no. 10, Mar. 10, 1924, pp. 400-401, 2 figs. System primarily developed by author for blast-furnace gases, but which should be effective and useful elsewhere, employs dust from gas as filtering medium for filtering out more dust.

Electric Discharges in. Studies of Electric Discharges in Gases at Low Pressures, I. Langmuir and H. Mott-Smith, Jr. Gen. Elec. Rev., vol. 27, nos. 7, 8, 9, 11, and 12, July, Aug., Sept., Nov., and Dec., 1924, pp. 449-455, 538-548, 616-623, 762-771, and 810-820, 14 figs. Study of phenomena of gaseous discharges, such as those of mercury-arc rectifier. By new methods of using collecting electrodes, quantitative measurements of many of the fundamental factors of gaseous discharges have been made possible. Theory of plane, cylindrical and spherical collectors, with retarding and accelerating fields. Typical experimental data with plane, cylindrical, and spherical collectors, and general discussion of these results and their interpretation.

Entropy and Chemical Constants. Absolute Entropy and the Chemical Constants of Polyatomic Gases (Absolute Entropie und chemische Konstanten mehratomiger Gase), J. K. Syrkin. Zeit. für Physik, vol. 24, no. 5-6, June 12, 1924, pp. 355-365. Author attempts to obtain expressions for entropy and chemical constant of polyatomic gases; comparison between results of calculation and experimental values; order of magnitude of results is same. Mathematical paper.

Equilibrium Constants, Calculation. The Calculation of Gaseous Equilibrium Constants, S. W. Saunders. Jl. Physical Chem., vol. 28, no. 11, Nov. 1924, pp. 1151-1166. Analysis of existing data on molecular heats of gases, heats of reaction, chemical and equilibrium constants for well-known reactions involving carbon, hydrogen, oxygen, and nitrogen.

Explosive Gas-Air Mixtures. Investigations of Combustible Gas- and Steam-Air Mixtures (Untersuchungen an explosiblen Gas- und Dampf-Luft-Gemischen), E. Berl and H. Fischer. Zeit. für Elektrochemie, vol. 30, no. 1, Jan. 1924, pp. 29-36, 3 figs. Determination according to new method of explosion limits of mixtures of air with carbon monoxide, hydrogen, methane, acetylene, ethylene, alcohol, aceton, ether, benzol and gasoline at atmospheric pressure and room temperature; influence of temperature on explosive range at 100, 200, and 300 deg. cent.; influence of subpressure on system, carbon monoxide-air. Bibliography.

Filling and Refilling Containers. Auxiliary Apparatus for Handling of Vacuum and Gas (Hilfsapparate für Vakuum- und Gasarbeiten), E. Brüche. Zeit. für technische Physik, vol. 5, no. 4, 1924, pp. 141-143, 3 figs. Describes two auxiliary apparatus, one for filling of gas in vacuum, and other for filling up gas under barometric pressure from one container to another.

Flame Propagation. See FLAME PROPAGATION.

Flames. See FLAME.

Flow of. See FLOW OF GASES.

Flowing, Heat Measurement of. Measurement of Large Quantities of Heat in Turbulent Streams of Gases (Ueber die Messung grosser Wärmemengen in turbulenten Gasströmen), A. Schack. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 3, June 1924, pp. 249-254. Discusses measurement of quantity of heat (in Kcal) in liquids or gases passing through pipe lines and its mathematical treatment.

Gas. See GAS.

Heat Connection in. See HEAT TRANSMISSION, Problems.

High and Low Vacua. Properties of Gases in High and Low Vacua, E. Rutherford. Engineering, vol. 117, nos. 3037, 3038, 3039, and 3440, Mar. 14, 21, 28, and Apr. 4, 1924, pp. 330, 365-366, 387, and 429, 10 figs. Abstracts of course

of lectures delivered before Roy. Instn. Mar. 14: History of production of vacua from original experiments of Torricelli in 1643 up to and including introduction of Gaede molecular pump in 1912. Mar. 21: Latest type of pump originated by Gaede; how measure of speed of pump could be framed on scientific lines. Mar. 28 and Apr. 4: Methods of measuring very low pressures.

Ignition. The Ignition of Gases. Chem. Soc.—Jl., vol. 125, Sept. 1924, pp. 1858-1875, 3 figs. Ignition by Impulsive Electrical Discharge. Mixtures of Paraffins with Air, by R. V. Wheeler; Ignition by a Heated Surface. Mixtures of the Paraffins with Air, by R. V. Wheeler and W. Mason.

See also IGNITION.

Isothermal Lines. Isothermal Lines of Some Gases up to 400 Deg. and Their Significance for Gas Thermometer (Ueber die Isothermen einiger Gase bis 400 deg. und ihre Bedeutung für Gasthermometer), L. Holborn and J. Otto. Zeit. für Physik, vol. 23, no. 1-2, Apr. 12, 1924, pp. 77-94, 2 figs. Measurement of isothermal lines up to pressure of 100 atmos. especially for gases of importance in gas thermoticity, i.e. nitrogen, oxygen, hydrogen, argon, helium, and neo-helium.

Kinetic Theory. Historical Origins and Fundamental Concepts of the Kinetic Theory of Gases (Origini storiche e concetti fondamentali della teoria cinetica dei gas), Giovanni Polvani. Nuovo Cimento, vol. 1, no. 1, Jan.-April 1924, pp. 1-48. Well-documented thesis on subject.

Magnetic Susceptibility of. The Magnetic Susceptibility of Helium, Neon, Argon, and Nitrogen, L. G. Hector. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 418-425, 2 figs. Results obtained for volume susceptibilities at 20 deg. cent. and 760 mm. pressure for helium, neon, argon and nitrogen are -0.780, -2.77, -7.52, and -4.91, respectively, all times 10^{-10}; they are probably accurate to within 2 per cent. These results are of order of magnitude required by Pauli's modification of Langevin theory of diamagnetism and also agree with values predicted by Joos from electron arrangements.

Mists, Analysis of. Quantitative Analysis of Mists and Fogs, Especially Acid Mists, H. C. Weber. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1239-1242, 7 figs. Describes methods that author has found successful for determination of mists, especially sulphuric-acid mists, in plant.

Monatomic, Quantum Theory of. The Quantum Theory of Monatomic Perfect Gases (Zur Quantentheorie der einatomigen idealen Gase), G. Schay. Zeit. für Physik, vol. 25, no. 1, June 24, 1924, pp. 37-41. Attempts to develop theory of degeneration of a gas which is free from objection attaching to previous attempts; develops formula from which entropy, energy, atomic heat, and pressure are deduced; it is shown that region in which degeneration takes place is infinitely small, which does not agree with previous theories of degeneration; essentially this requires that gas atoms may be considered as mass points, whose extent of mutual influence can be neglected.

Phosgene in Mixtures. Determination of Phosgene in Gas Mixtures (Ueber die Bestimmung von Phosgen in Gasgemischen), G. Bredig and A. von Goldberger. Gas- u. Wasserfach, vol. 67, no. 33, Aug. 16, 1924, pp. 490-491. Describes new method of determination.

Radiation from. The Radiation from Combustible Gases and Its Practical Determination (Ueber die Strahlung der Feuergase und ihre praktische Berechnung), A. Schack. Zeit. für technische Physik, vol. 5, no. 6, 1924, pp. 267-278, 1 fig. Experimental results show that radiation from certain gaseous bodies approximately increases with temperature in accordance with Planck's radiation law; devises method for estimation of radiation from gaseous bodies; with help of known measurements of absorption spectra and total absorption of CO_2 and water vapor, formulas are deduced for calculation of radiation from gaseous bodies containing CO_2 and aqueous vapor.

Rarefied, Electric Discharge in. Discharge at High Frequency in Rarefied Gases (Sur le décharge à haute fréquence dans les gaz raréfiés), G. Gutton, S. K. Mitra and V. Ylostalo. Jl. de Physique et le Radium, vol. 4, no. 11, Nov. 1923, pp. 420-428, 6 figs. Authors have made series of measurements at constant frequency and variable pressure and plotted corresponding curves, which, at constant frequency, indicate, in function of pressure, difference of effective potential under which tubes become luminous; results of experiments with tubes with inside and outside electrodes.

Specific Heat. Measurement of Specific Heat C_v of Gases by Means of the Differential Method (Die Messung der spezifischen Wärme C_v von Gasen mittels der Differentialmethods), M. Trautz and K. Hebbel. Annalen der Physik, vol. 74, no. 12, 1924, pp. 285-324, 13 figs. Discusses principles of differential method and describes apparatus used.

Temperature Gradient. On the Temperature Gradient in Gases at Various Pressures, W. Mandell and J. West. Physical Soc. Lond.—Proc., vol. 37, no. 206, Dec. 15, 1924, pp. 20-41 (includes discussion), 11 figs. Gives curves indicating these gradients at various pressures and other relations; among other features, they show quite definitely existence in contact with vessel walls, at low pressures, of very large "temperature jumps."

Theory. Theory of Gases and Equation of State (Théorie des gaz et equation d'état), J. Duclaux. Journal de Physique et le Radium, vol. 5, no. 11, Nov. 1924, pp. 331-337. Discusses theory of real gases and develops equation of state which at constant temperature reduces to that of Van der Waal and at various temperatures to that of Leduc.

Velocity of Sound in. On the Velocity of Sound in Gases and Vapours, and the Ratio of the Specific Heats, H. B. Dixon and G. Greenwood. Roy. Soc.—Proc., vol. 105, no. A730, Feb. 1, 1924, pp. 199-220, 4 figs. Experiments made in continuation of those carried out by Dixon, Campbell and Parker on velocity of sound in gases at high temperatures; object was to determine velocity of sound in vapors of low-boiling inflammable liquids.

GASOLINE

Analysis. Analysis of Some United States Gasolines, A. C. Zimmerman. U. S. Air Service Information Circular, vol. 5, no. 465, May 1, 1924, 5 pp. Details of tests made to determine approximately content of aromatics, naphthene, and paraffin hydrocarbons of United States gasoline from various sources.

Catalytic Production Method. Petrol Production by the Catalytic Method. Petroleum Times, vol. 11, no. 261, Jan. 5, 1924, p. 16. Describes development of Sabatier-Mailhe catalytic method of obtaining light oils from heavier fractions of crude petroleum, including kerosene fraction.

Cracked, Coloring Matter of. The Volatile Yellow Coloring Matter in Cracked Gasolines, B. T. Brooks and H. O. Parker. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 587-588. Writers believe that this matter is due to presence of hydrocarbons containing conjugated unsaturated groups.

Cracking Processes. The Manufacture of Gasoline by the Cracking of Heavier Oils, C. M. John-

son. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 879-885. Principles of cracking; classification and comparison of various processes employed, their relative advantages and disadvantages; describes 12 processes in commercial use in United States, giving dimensions of apparatus as well as data on temperatures and pressures employed, quantities of raw-oil charges, percentages of gasoline obtained, etc.

Developments. The Present Position of Gasolene, J. E. Hackford. Oil Eng. & Finance, vol. 5, nos. 103 and 104, Nov. and Dec. 1924, pp. 628-630, and 680 and 682-683. Review of United States, German, British, and Russian patents.

Distillation Test. The Distillation Test of Gasoline, W. G. Clark. Natural Gas, vol. 5, no. 1, Jan. 1924, pp. 22 and 61. How actual making of test is accomplished; gasoline specifications.

Heat Exchangers. Modern Heat Exchange Equipment, Geo. A. Burrell. Chem. & Met. Eng., vol. 30, no. 11, Mar. 17, 1924, pp. 436-439, 2 figs. Petroleum and natural-gas gasoline plant practice discussed as illustration of heat-exchanger design and operation.

Natural-Gas. Application of Refrigeration Processes to the Production of Natural Gasoline, E. F. Burton. Refrig. Eng., vol. 11, no. 3, Sept. 1924, pp. 83-90, 8 figs. Notes based upon experience and observation of author and information obtained through publications of Bur. of Mines and other publications; author believes that more attention should be given to utilization of waste residue gas for production of low temperatures through expander, and that further investigation be made of possibilities of using more volatile parts of plant product, especially propane, for cooling gases.

Comparative Tests of Scrubbing Natural Gas (Vergleichende Versuche zur Erdgaswaschung), G. Weissenberger. Petroleum, vol. 20, no. 33, Nov. 20, 1924, pp. 1817-1825, 2 figs. Discusses tests made at Boryslaw in gasoline recovery as to superiority of Bregeat process and gives absorption figures.

Composition of Natural Gas Gasoline, R. P. Anderson and A. M. Erskine. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 263-267, 5 figs. Study of chemical composition of natural-gas gasoline by separating constituents by fractional distillation in sufficiently pure state to make possible their identification.

Natural-Gas Gasoline in 1922, G. B. Richardson. U. S. Geol. Surv., no. II:30, Apr. 24, 1924, pp. 347-351. United States production statistics.

On the Composition of Gasoline from Natural Gas, V. Tvercyn. Petroleum & Oil-Shale Industry, vol. 5, no. 9, Sept. 1923, pp. 256-257. Investigation of gasoline obtained from natural gas. (In Russian, with brief extract in English.)

Past, Present and Future of Natural Gasoline Industry, H. J. Struth. Oil Trade Jl., vol. 15, no. 4, Apr. 1924, pp. 68, 70, and 96, 3 figs.

Savings Effected By Use Of Stabilizer In Natural Gasoline Plants, L. F. Bayer. Nat. Petroleum News, vol. 16, no. 18, Apr. 30, 1924, pp. 24-29, 4 figs. Account of results obtained by a licensee, Tidal Refining Co., Tulsa, Okla., by using process on a large commercial scale.

The Gasoline Extraction Process, F. A. McLean. Can. Min. Jl., vol. 45, no. 4, Jan. 25, 1924, pp. 98-99, 1 fig. Description of method and equipment required for extracting gasoline from natural gas.

Quality Determination. Factors Entering Into Good Gasoline, C. A. Wendt. Oil & Gas Jl., vol. 23, no. 14, Mar. 6, 1924, pp. 92 and 137, 2 figs. Ways of determining if grade is best from standpoint of automobile owner. Study of distillation curves is good way.

Refrigerant, Use as. See REFRIGERANTS, Natural-Gas Gasoline.

Storage. See LIQUIDS, Inflammable, Storage of.

Surveys, United States. Tenth Semi-Annual Motor Gasoline Survey, N. F. LeJeune and B. A. Landry. U. S. Bur. Mines—Reports of Investigations, no. 2636, Sept. 1924, 11 pp., 1 fig. Results of survey to determine changes in characteristics of motor gasoline being sold in United States, and comparison with previous surveys made.

Vapor-Phase Refining. Vapor Phase Refining of Gasoline, D. M. Liddell. Chem. & Met. Eng., vol. 31, no. 25, Dec. 22, 1924, pp. 975-976, 3 figs. First large-scale plant to use gray catalytic process shows interesting results as compared with sulphuric-acid refining.

GASOLINE ENGINES

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES.]

Air Consumption and Power. Air Consumption and Power of Petrol Engines, H. Moss. Engineering, vol. 117, no. 3042, Apr. 18, 1924, pp. 507-509, 5 figs. Relationship of air consumption to brake horsepower in internal-combustion engines; road and flight tests. (Abstract.) Paper read before Instn. Mech. Engrs.

Radiotelegraph Equipment. A Petrol Engine for Wireless Telegraph Equipment. Engineering, vol. 117, no. 3029, Jan. 18, 1924, p. 76, 5 figs. Describes small engines constructed by J. W. Brooke & Co.

Two-Cycle. Two-Cycle Gasoline Engines (Il motore a benzina a due tempi), Pasquale Borracci. Industria, vol. 38, no. 1, Jan. 15, 1924, pp. 7-11, 4 figs. Discusses their advantages in relation to their possible application in automotive work.

Water Condensation from Exhaust-Gas. Heat Transfer in the Condensation of Water from Engine Exhaust Gas, Rob. F. Kohr and L. Butler. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 885-889, 8 figs. Describes apparatus devised by Bur. of Standards for condensing large part of water contained in exhaust, thus making it possible continually to compensate during flight of gas-filled airships for weight of fuel burned.

GASOMETERS. See GAS HOLDERS.

GEAR CUTTING

Bevel Gears. Gear Machining (Zahnräderbearbeitung), G. Olah. Werkstattstechnik, vol. 18, no. 5, Mar. 1, 1924, pp. 121-134, 44 figs. Describes different methods and machines for producing bevel gears.

The Cutting of Bevel Gears on the Universal Milling Machine (Das Fräsen von Kegelrädern auf der Universalfräsmaschine), M. Raudnitz. Werkstattstechnik, vol. 18, no. 5, Mar. 1, 1924, pp. 135-141, 24 figs. Development of method, based on theoretical investigaion of a bevel-gear tooth face, according to which bevel gears can be generated on universal milling machine with side-milling cutter, without aid of special devices, and more nearly approaching theoretically correct form.

The Cutting of Bevel Gears with Profile Cutters (Schneiden von Kegelrädern mit Formfräsern). Werkstattstechnik, vol. 18, no. 5, Mar. 1, 1924, pp. 156-158, 7 figs. Adjustment of cutter and bevel-gear rings; cutting of gear segments and of double-angle bevel gears. See also articles entitled Rough Turning of Bevel Gears (Schruppen von Kegelrädern), pp. 158-161, 11 figs.; and Cutting of Spiral Bevel Gears with Worm Hobs (Fräsen von Spiralkegelrädern mit Schneckenfräsern), pp. 161-167, 16 figs.

Helical Gears. A New Double Helical Gear Generator. Engineer, vol. 138, no. 3590, Oct. 17,

1924, pp. 445-447, 9 figs. Improved machine for cutting double helical gear wheels by generating process, designed and built by D. Brown & Sons.

Herringbone Gears. Machining Large Herringbone Gears, H. Campbell. Am. Mach., vol. 60, no. 17, Apr. 24, 1924, pp. 625-628, 12 figs. Manufacture of gears of unusual size for reduction units by Falk Corpn., Milwaukee, Wis.; hobbing gears 16 ft. in diam.; grinding in teeth and balancing; hob making and grinding.

Hobbing Machines. See HOBBING MACHINES.

Instrument Gears. Cutting Instrument Gears. Machy. (Lond.), vol. 24, nos. 604 and 609, Apr. 24 and May 29, 1924, pp. 103-107 and 273-274, 17 figs. Apr. 24: Production of small gears by means of hand-operated and automatic machines of formed-cutter and hobbing types. May 29: Application of hobbing process and production of small pinions in rod form.

Machines. Machines for Generating Gears (Maschinen zur Bearbeitung von Zahnrädern), P. Stephan. Werkstattstechnik, vol. 18, no. 23, Dec. 1, 1924, pp. 696-701, 20 figs. Slotting machine for use in automobile factories; small automatic gear-milling machines.

Processes. Bases and Recent Progress in Gear Cutting (Grundlagen und neuere Fortschritte der Zahnrädererzeugung), K. Kutzbach. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 36 and 41, Sept. 6 and Oct. 11, 1924, pp. 913-920, and 1075-1081, 74 figs. Discusses various kinds of gears, teeth- and gear-cutting apparatus of different makes; grinding processes.

Projector for Cutter Forming. Using an Optical Projector for Cutter Forming, R. Grant. Machy. (N Y.), vol. 31, no. 3, Nov. 1924, pp. 200-201, 3 figs. Procedure followed in duplicating established tooth form with aid of projector.

Quality Testing. Quality Testing in the Manufacture of Gears (Güteprüfung bei der Zahnradherstellung), Frommer. Werkstattstechnik, vol. 18, no. 6, Mar. 15, 1924, pp. 176-178, 6 figs. Arrangements for investigation of helicoidal cutter of cutting machine and finished wheel; profile-testing machines; testing of pitch and trueness; investigation of condition of cutting machine.

Racks. Rack Cutting. Machy. (Lond.), vol. 24, no. 608, May 22, 1924, pp. 235-237, 5 figs. Practice in cutting racks on machines designed for this work.

Spur Gears. Spur-Gear Machining (Stirnräderbearbeitung), Barth. Werkstattstechnik, vol. 18, no. 4, Feb. 15, 1924, pp. 75-98, 119 figs. Describes different methods and machines for producing spur gears.

Sykes Generator. Gear Shaping, with Particular Reference to the "Sykes" Generating System, O. H. Medcalfe. Eng. Production, vol. 7, no. 147, Dec. 1924, pp. 349-352, 6 figs. and (discussion), vol. 8, no. 148, Jan. 1925, pp. 22-24, 1 fig. Deals principally with straight spur, single, double helical, and internal gears connecting parallel shafts; describes Sykes double helical gear generating machine S.D.H.12.

Truck Drive. Machining Gears for an Electric-Truck Driving Mechanism, F. H. Colvin. Am. Mach., vol. 61, no. 14, Oct. 2, 1924, pp. 535-537, 11 figs. Describes machining of gears for drive of trucks built by Commercial Truck Co., Philadelphia, Pa. Special tools for undercutting; fixtures for hardening bore of gear; overcoming distortion in large internal gears.

GEARS

Annular. Annular Gearing, Its Design and Application, P. H. Bruant. Am. Mach., vol. 60, no. 4, Jan. 24, 1924, pp. 125-128, 6 figs. Principle and method of operation; action of gear teeth; points on design of annular gear sets; constructions employed to give uniform speed.

Automobile. See Quiet; AUTOMOBILES, Transmissions.

Bevel. See Spiral Bevel.

Bevel, Testing. See JIGS, Bevel-Gear-Testing.

Blanks, Heat Treating. See STEEL, HEAT TREATMENT OF, Gear Blanks.

British Industry. Development of British Gear Industry, W. E. Sykes. Iron Age, vol. 113, no. 20, May 15, 1924, pp. 1419-1420. Specialist group studying to improve product and extend field of gear applications; status of technical and shop practice. (Abstract.) Address before Am. Gear Mfrs.' Assn.

Calculation. Charts for Gear Calculation. F. H. Towler. Machy. (Lond.), vol. 24, no. 622, Aug. 28, 1924, pp. 678-679, 3 charts on supp. plate. Gives charts relating to machine-cut straight-toothed spur and double helical gearing, also pitch-line velocity chart. Constructed on logarithmic principle.

Super-accuracy in Gear Ratios, T. M. Lowthian and W. Owen. Engineer, vol. 137, no. 3555, Feb. 15, 1924, pp. 164-166. Describes simple method of calculating gear ratios.

The Calculation of Gears for Machine-Tool Construction (Zahnradberechnung für den Werkzeugmaschinenbau), A. Eberwein. Maschinenbau, vol. 3, no. 11, Mar. 13, 1924, pp. 359-361, 4 figs. Formulas are derived for calculation of machine-tool gears, making use of modulus method.

The Coplanar Movement of a Plane Whose Velocity is Given (Die komplane Bewegung einer Ebene, deren Geschwindigkeitszustand gegeben ist), H. Alt. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 3, June 1924, pp. 243-249, 11 figs. Treats question of how a plane must move if its state of velocity is given. Applicable to gear construction, where a member in its movement has to comply with a specified state of velocity.

See also Design.

Cases. Molds Large Iron Gear Cases, P. Dwyer. Foundry, vol. 52, no. 16, Aug. 15, 1924, pp. 623-627 and 652, 10 figs. Detailed description of molding practice involved in production of these large shells in which bulk is out of all proportion to weight.

Chucking. Better Ways of Chucking Gears for Grinding. Can. Machy., vol. 31, no. 1, Jan. 3, 1924, pp. 21-23, 14 figs. Every care must be taken in selection of material, preparation of blanks, setting and cutting on machine, heat treatment and bore grinding operation.

Cutting. See GEAR CUTTING.

Design. A Design Chart for Industrial Gears, T. F. Stacey. Am. Mach., vol. 61, no. 17, Oct. 23, 1924, pp. 643-644, 1 fig. Presents chart which permits selection of proper gear without any mathematical calculations.

A New Chart for the Design of Spur Gears, H. E. Merritt. Machy. (Lond.), vol. 23, no. 588, Jan. 3, 1924, pp. 457-458, 4 figs. Chart includes all variables introduced in gear-design calculations, and being composed of straight lines throughout, gives results of great degree of accuracy; will cover all possible dimensions, speeds, and stresses met with in practice.

Gear Designing Tables, L. S. Burbank. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 141-143. Gives four tables which provide a simple and direct method of determining relation between pitch and power-transmitting capacity of either spur gearing or bevel gearing.

Gears. Maschinenbau, vol. 3, no. 7, Jan. 10, 1924. Contains following articles: High-Grade Spur-Wheel Gear (Hochwertige Stirnradgetriebe

mit Pfeilverzahnung), E. Meyer, pp. 159-163, 7 figs.; Use of Gears in the Reconstruction of Power Plants (Verwendung von Zahnradgetrieben bei Umbauten von Kraftanlagen), H. Klein, pp. 163-166, 8 figs.; Determination of Duration of Contact in Spur Gears (Bestimmung der Eingriffsdauer bei Stirnrädern), J. Dalchau, pp. 166-168, 5 figs.; Aspects for the Design of Friction Gears (Einige Gesichtspunkte für die Konstruktion von Reibungstgetrieben), G. Sacks, pp. 168-175, 30 figs.; Differential Gear (Differentialgetriebe), C. v. Dobbeler, pp. 175-177, 4 figs.

See also Calculation.

Differential. Methods of Machine Tool Design, A. L. De Leeuw. Am. Mach., vol. 60, no. 17, Apr. 24, 1924, pp. 621-624, 5 figs. Differential gearing finds its principal machine-tool application in feed mechanism; differential indexing mechanisms.

Double Helical. Proper Profile of Miller for Double Helical Spur-Gear (Das richtige Profil des Fingerfräsers für Kammwalzen), B. Szöke. Werkstattstechnik, vol. 18, no. 16, Aug. 15, 1924, pp. 417-421, 18 figs. Discusses calculation of theoretically correct construction, and approximations deduced from it, correcting a general error in profile.

Epicyclic. Epicyclic Gears, F. W. and G. H. Lanchester. Instn. Mech. Engrs.—Proc., no. 4, July 1924, pp. 605-631, 17 figs. Notes on function of gear box; epicyclic gear as developed on Lanchester car; definite characteristics of gear boxes; actuating mechanism of epicyclic gear; permissible load carried by teeth and bearings.

Epicyclic Spur-Gear Trains, J. Cryer. Mech. Wld., vol. 76, no. 1969, Sept. 26, 1924, pp. 194-196, 12 figs. Résumé of principles and consideration of applications for ship propulsion and other purposes.

Friction. See FRICTION GEARING.

Gear Sets, Specifications. American Stock Gear-set Specifications. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, p. 421. Specifications of different makes for passenger cars, buses, trucks, and tractors.

Grinding Machines. See GRINDING MACHINES, Gear.

Helical. Helical Gear Problems Simplified, O. M. Burkhardt. Am. Mach., vol. 61, no. 14, Oct. 2, 1924, pp. 529-530. Method of calculation which will render graphical solutions far more accurate than before.

High-Grade Helical Spur Wheel Gears, E. Meyer. Eng. Progress, vol. 5, no. 6, June 1924, pp. 113-117, 7 figs. Cutting teeth; materials; tooth load and velocity; angle of pitch and pitch of teeth; bearings of pinion shaft; toothed wheel gears for vertical shafts; ratio of gearing and output; assembly; lubrication; efficiency; silent running; life and use.

Interference Between Helical Gears on Parallel Shafts, J. B. Arnold. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 538-540, 3 figs. Formulas are deduced for redesigning a helical ring gear and pinion to meet requirements of fixed ratio and center distance.

The Graphical Solution of Helical Gear Problems, F. Szabo. Am. Mach., vol. 60, no. 11, Mar. 13, 1924, pp. 391-394, 11 figs. Method for investigating characteristics of helical gearing; approximate solution to problem easily obtainable; trial calculations eliminated; method adapted to all conditions.

See also Double Helical.

Hob Tooth Form. Hob Tooth Form, H. E. Merritt. Machy. (Lond.), vol. 24, no. 613, June 26, 1924, pp. 391-395, 4 figs. Shows that a hob can produce teeth which are mathematically exact involute teeth (neglecting effect of gashes in hob) and examines necessary axial section which hob teeth must have in order to achieve this result.

Involute. Degree of Irregularity of Involute Spur Gears (Ungleichförmigkeitsgrad von Evolventenstirnrädern), C. Miklósy. Werkstattstechnik, vol. 18, no. 6, Mar. 15, 1924, pp. 173-175, 3 figs. Author traces by calculation the irregular course of involute gears and describes method of determining series of cutters for a given degree of irregularity.

Interference in Involute Spur Gears, H. E. Merritt. Machy. (Lond.), vols. 24 and 25, nos. 626, 630, and 631, Sept. 25, Oct. 23, and 30, 1924, pp. 813-815, 97-99, and 145-149, 20 figs. Deals with true involute gears produced by a generating process, devoting attention primarily to those gears generated by a cutter of rack form.

Involute Gear Teeth. Automobile Engr., vol. 14, no. 192, Aug. 1924, pp. 237-242, 8 figs. Notes on interference, undercutting, and conditions of contact in spur gears.

Limiting Cases in Involute Spur Gearing, A. B. Cox. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 683-691 and (discussion) 691-692, 15 figs. Derives formulas by means of which it is possible to determine smallest number of teeth that involute spur gear can have and yet be a perfect gear; discusses three sets of limiting cases; presents new polar formula for involute which, it is believed, will serve as valuable tool for further analysis of gearing.

Lubrication. Gearing and Gear Lubricants, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July, 1924, pp. 18-24, 10 figs. Specialized needs of various types of modern gears.

Maag. Speed Reduction in Power Transmission. Colliery Guardian, vol. 128, no. 3337, Dec. 12, 1924, pp. 1500-1501, 7 figs. Some applications of Maag gears in South Wales.

Machining. Machining Change-Gears, A. Clegg. Mech. World, vol. 74, nos. 1925 and 1928, Nov. 28 and Dec. 14, 1923, and vol. 75, no. 1931, Jan. 4, 1924, pp. 318-319, 366-367, and 2-3, 7 figs. Notes on machining change-gear blanks. Deals with handling, chucking, boring, turning, cutting speeds and feeds for both turning and boring, number of cuts that can proceed simultaneously, etc.

Manufacturers' Problems. The Gear Manufacturer Needed, L. G. Hewins. Am. Mach., vol. 60, no. 20, May 15, 1924, pp. 743-746. Three classes of gear users and their needs; gear manufacturers in four classes; need of analysis of customers' requirements and for planning production.

Marine. A Basis for the Explanation of Marine Gearing Troubles, Wm. Sellar. Inst. Mar. Engrs.—Trans., vol. 35, Feb. 1924, pp. 525-570, 63 figs. It is shown that as gears become more accurately cut the more likely will twist and bending of pinion be counted as responsible for troubles that may arise, and author advises designers to look further into subject of bending and twisting of pinion.

Measuring Machines. The Wickman Gear Measuring Machine. Eng. Production, vol. 7, no. 146, Nov. 1924, pp. 317-318, 4 figs. Details of unit for routine testing.

Micarta Silent. Silent Gears for Machine Tools, T. C. Roantree. Machy. (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 363-364, 2 figs. Properties of Micarta gears and applications in machine-tool field.

Noises, Causes and Remedies. Noisy Timing Gears—Causes and Remedies, C. M. Aldrich. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 116-121, 4 figs. Fundamental causes of noises in hobbed helical gears, and suggestions for prevent-

ing objectionable noise without resorting to expensive finishing operations.

See also Quiet.

Non-Metallic. Laboratory Tests of Non-Metallic Gears, H. R. Moyer. Am. Mach., vol. 60, no. 14, Apr. 3, 1924, pp. 505-507, 4 figs. Work done to determine strength and endurance; evolution of testing equipment; tests for vibration and effect of oil; reproducing service conditions.

See also Micarta.

Patterns, Metal. See PATTERNS, Metal Gear Patterns.

Pinions, Dynamic Stresses in Rotating. Mathematical Theory of Dynamic Stresses in Rotating Gear Pinions, P. Heymans. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 583-587 and (discussion) 587-589, 3 figs. Theoretical study of dynamic stresses in rotating gear pinions developed in course of investigation by photoelastic method of stresses in gear pinions undertaken by Research Laboratories and Ry. Motor Eng. Dept. of Gen. Elec. Co., Schenectady, N. Y., conducted at Mass. Inst. Technology. Shows that in all disturbed elastic media a force applied cyclically along any closed contour results in oscillatory deformations and corresponding dynamic stresses. Likewise in rotating gear pinions a torque acting on perfectly formed and spaced gear teeth sets up similar dynamic stresses.

Planetarium. Projecting Planetarium of the German Museum at Munich (Das Projektions-Planetarium des Deutschen Museums in München), W. Bauersfeld. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 31, Aug. 2, 1924, pp. 793-797, 13 figs. Details of gearing of planetarium made by Zeiss in Jena situated at center of hemisphere and representing motion of heavenly bodies in sense of Ptolemy by system of projecting apparatus.

Planetary. Planetary Gearing, F. DeR. Furman. Machy. (N. Y.), vol. 30, no. 12, and vol. 31, nos. 1, 2, 3, and 4, Aug., Sept., Oct., Nov. and Dec. 1924, pp. 938-941, 6-9, 95-98, 175-178, and 311-314, 22 figs. See also Machy. (Lond.), vols. 24 and 25, nos. 623, 625, 629, and 634, Sept. 4, 18, Oct. 16, and Nov. 20, 1924, pp. 705-708, 802-805, 65-68, and 233-236, 17 figs. Complete treatise on simplified solutions of various planetary-gear problems, including reliable graphical method of checking calculations. Sept.: Review of principles; racks as driving and fixed members; double planet wheels; multiplying and reversing actions. Oct.: Combinations in which arm for planet wheels is keyed to driving shaft; methods of solution when planet wheel arm is an idler. Nov.: Analysis of planet-wheel motion. Dec.: Effects of using different pitches for different pairs of mating gears.

See also HOISTS, Planetary Gearing for.

Quiet, Production of. Quiet Gears and Their Production. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 545-557, 14 figs. Symposium regarding advantages of various production methods adopted by several leading automobile companies for reducing noise of gears and results obtained by use of these methods, containing following papers: Some Sidelights on the Gear Problem, W. R. Griswold; Need of Grinding Carburized and Hardened Gears, O. H. Schafer; Oil-Treated Steel and Ground Gears, L. A. Danse; Polishing and Burnishing of Gear Teeth, R. E. Linn; Checking Tooth-Forms by the Comparator, W. G. Hildorf; and Importance of Accuracy of Tooth-Form, A. H. Frauenthal.

Reduction. See REDUCTION GEARS.

Reversing, Tooth Position for. Calculation of Tooth Position for Spur-Wheel Reversing Gear (Berechnung der Räderstellung für Stirnräderwendegetriebe), K. Hoecken. Maschinenbau, vol. 3, no. 8, Jan. 24, 1924, pp. 197-200, 4 figs. For reversing gear with axially movable and disengageable change wheels, position of teeth when changing is calculated which is necessary to permit the engagement of teeth.

Rotary. Rotary Gear for Driving Machine Tools and Hoists (Kapselgetriebe für den Antrieb von Werkzeugmaschinen und Hebezeugen), O. Keller. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 653-655, 7 figs. Details of construction and action of new hydraulic rotary gears with continuous change of ratio and reversing.

Spiral. Chart for Designing Spiral Gears, T. C. Campbell. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 460-462. See also Machy. (Lond.), vol. 25, no. 633, Nov. 13, 1924, pp. 214-216, 1 fig. Chart shows at glance all possible gear combinations that may be used, together with number of teeth and approximate spiral angles of all gears of any combination that may be selected.

Spiral Gearing: Measurement of Shaft and Tooth Angles, H. E. Merritt. Mech. World, vol. 76, no. 1976, Nov. 14, 1924, p. 306, 3 figs. Describes method which involves algebraic summation of angles; results show that spiral angle is angle between teeth and axis, and is positive if right-hand, and negative if left-hand; sum of spiral angles is always equal to shaft angle.

Spiral Bevel. Spiral Bevel Gears. Machy. (Lond.), vol. 24, no. 605, May 1, 1924, pp. 138-141, 6 figs. Deals with type produced on Gleason principle in which, owing to spiral effect, tooth thickness cannot be measured on outer circumference as can be done in case of straight-tooth bevel gears, but should be measured across normal section of tooth.

The Application of Spiral Bevel Gears, F. E. McMullen. Am. Mach., vol. 60, no. 20, May 15, 1924, pp. 721-722. Paper presented before Am. Gear Mfrs. Assn.

Tooth Bearing Control for Spiral Bevel Gears, Chas. H. Logue. Am. Mach., vol. 60, no. 15, Apr. 10, 1924, pp. 549-553, 9 figs. Importance of position of bearing along teeth; measurement of blacklash by "pinion inclination"; "pinion intersection"; design and operation of suitable testing machine.

Spur. Standardized Roller for Checking Spur Gears, W. H. Folds. Machy. (Lond.), vol. 23, no. 598, Mar. 13, 1924, pp. 765-767, 3 figs. Writer proposed to standardize, to some extent, roller-check method by use of tables of factors, which makes it possible to use any size roller that will form contact on tooth faces or flanks, and from given diameter of roller overall measurement over roller as it is located in teeth of gear can be calculated.

The Strength of Spur Gears. Automobile Engr., vol. 14, no. 193, Sept. 1924, pp. 262-264, 6 figs. Gives method of accurately estimating stresses involved.

See also Design; Helical; Involute.

Standardization. Further Advances in Gear Standardization. Iron Age, vol. 113, no. 19, May 8, 1924, pp. 1365-1367. Stub tooth standard adopted at Am. Gear Mfrs.' Assn. meeting; progress of other committees.

Proposed Standardization of Gearing. Machy. (N. Y.), vol. 30, no. 5, Jan. 1924, pp. 374-377, 6 figs. Abstract of report before Am. Gear Mfrs.' Assn.

Steel, Heat Treatment of. Heat-Treatment of Steel Gears, J. K. Wood. Am. Mach., vol. 61, no. 15, Oct. 9, 1924, pp. 567-570. Discussion of factors in manufacture of steel gears and proper heat treatment methods for various steels.

Strength of. See Spur.

Stresses in, Photoelastic Analysis. See ELECTRIC MOTORS, Railway; PHOTOELASTICITY, Gear Stresses, Analysis of.

Teeth, Enveloping. "Enveloping" Gear Teeth. Engineering, vol. 117, no. 3035, Feb. 29, 1924, pp. 257-258, 4 figs. Refers to type of tooth which, after exhaustive comparative tests, has been definitely adopted by Vickers Ltd., as Vickers, Bostock & Bramley "enveloping" gear teeth; gives results of tests.

Teeth, Evolution of. Historical Notes on Gear Teeth, L. D. Burlingame. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 529-534, 10 figs. Evolution of gear teeth from crude beginnings and early equipment for cutting.

Teeth, Repairing. Repairing a Broken Gear Tooth by Means of Studs, G. H. Radebaugh. Coal Age, vol. 26, no. 11, Sept. 11, 1924, pp. 359-362, 17 figs. Several ways available for repairing broken teeth. Studding is simplest. An accurate templet is necessary to which inserted studs must be fitted.

Teeth, Shape of. Effect of Shape of Tooth on Quality of Gears (Der Einfluss der Zahnform auf die Güte der Verzahnung), G. Olah. Werkstafts-technik, vol. 18, nos. 16 and 17, Aug. 15 and Sept. 1, 1924, pp. 424-427 and 456-461, 25 figs. Proposed standardization of curves of teeth; conditions gearings must fulfill; comparison of different kinds of involute teeth in order to find most favorable shape.

Form of Gear Teeth (Zahnformfragen), G. Karrass. Praktische Maschinen-Konstrukteur, vol. 57, no. 36, Sept. 23, 1924, pp. 489-492, 5 figs. Discusses cycloid and involute teeth and proposes a larger angle of pitch than the 15 deg. used hitherto.

The Influence of Shape of Tooth on Quality of Gearing (Der Einfluss der Zahnform auf die Güte der Verzahnung), G. Olah. Werkstattstechnik, vol. 18, nos. 24, Dec. 15, 1924, pp. 740-743, 7 figs. Contributions to problem of standardization of tooth curves.

Testing. Gear Testing. British Machine Tool Eng., vol. 3, no. 28, July-Aug. 1924, pp. 81-83, 12 figs. Gives methods of testing teeth of gear wheels, illustrating and describing a number of gear-testing jigs.

Gear Testing and Special Production (Zahnräderprüfung und Sonderherstellung), A. Steinle. Werkstattstechnik, vol. 18, no. 6, Mar. 15, 1924, pp. 169-173, 22 figs. Optical testing methods and instruments.

Gear-Tooth Testing, Jos Horner. Engineering, vol. 118, nos. 3073 and 3077, Nov. 21 and Dec. 29, 1924, pp. 696-698 and 821-823, 21 figs. Discusses methods and machines.

Testing and Adjusting Spiral Bevel Gear Drives for Automobiles. Am. Mach., vol. 61, no. 22, Nov. 27, 1924, pp. 848-849, 14 figs. Printed by permission of The Gleason Works, Rochester, N. Y.

Universal Gear Testing Machine, F. Johnstone-Taylor. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 289-291, 7 figs. Machine developed by Nat. Phys. Laboratory of Great Britain which may be used for any kind of gear and for recording errors in running of meshed gears.

Tooth-Section Generator. An Improved Photomechanical Tooth-section Generator, H. E. Merritt. Machy. (Lond.), vol. 24, no. 625, Sept. 18, 1924, pp. 777-779, 6 figs. Describes improved form of apparatus for obtaining a large-scale profile of any generated gear-tooth section by a photographic process. Gives a tooth section in white on a black ground.

Transmission. The Schwartzkopf-Huwiler Gear (Das Schwartzkopf-Huwiler-Getriebe). Schweizerische Bauzeitung, vol. 84, no. 25, Dec. 20, 1924, pp. 300-302, 6 figs. A hydraulic transmission gear consisting of pump and motor, single- or double-acting, enabling starting machine tools with motor at full speed.

Types. Various Forms of Gears and Their Uses, G. H. Radebaugh. Coal Age, vol. 26, no. 4, July 24, 1924, pp. 125-126, 20 figs. Spur gears with shafts parallel; bevel gears with shafts at angles but in one plane; worm gears with shafts at right angles but in different planes.

Variable-Speed. A New Variable Speed Gear, O. Keller. Engineer, vol. 137, no. 3558, Mar. 7, 1924, p. 262, 6 figs. Describes Schneider variable-speed gear, new form designed for quick reversal with infiinite range of speed gradation from rest up to full speed in either direction. Translated from Schweiz. Bauzeitung.

Worm. A New Enveloping Worm Gear. Machy. (Lond.), vol. 23, no. 599, Mar. 20, 1924, pp. 819-820, 4 figs. Describes form of worm gear with very high load-carrying capacity, which is extension of principle of straight-line generation to include its application to production of Hindley-type worm tow hich term "enveloping" gear has been applied.

Worm Gears and Windlasses, H. S. Howard. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 1, Feb. 1924, pp. 18-29. Conclusions and decisions as to future heavy-duty worm gears which may be built: worm gear which was investigated was in windlass of battleship Tennessee.

GELATIN

Amphoteric Character of. The Amphoteric Character of Gelatine and Its Bearing on Certain Electrochemical Phenomena, P. K. Frolich. Am. Electrochem. Soc.—Advance Paper no. 11, for meeting Oct. 2-4, 1924, pp. 153-169, 2 figs. Shows that electrochemical reactions involving gelatin (glue) are readily explained in light of modern knowledge of physical chemistry of proteins. Discusses mechanism of copper deposition from acid electrolytes containing gelatin, and suggests an explanation to account for effect of gelatin as an addition agent in electrodeposition.

Manufacture. The Technology of Gelatin, F. R. Johnson. Armour Engr., vol. 15, no. 2, Jan. 1924, pp. 49-51 and 70, 4 figs. Complete description of manufacture of gelatin.

GEOLOGY

Groundwaters. Notes on Groundwaters, G. F. Loughlin. Economic Geology, vol. 19, no. 1, Jan.-Feb. 1924, pp. 62-71, 2 figs. Deals with (1) deviation from general relation between groundwater surface and land surface; (2) lower limits of groundwater; (3) changes in groundwater level during tertiary and quaternary time; and (4) chemical work of groundwaters.

Isostacy, Theory of. See ISOSTACY.

Tasmania. An Outline of the Economic Geology of Tasmania, L. Hills. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 129-147, 1 fig. Discusses ore deposits, their geologic distribution; coal and oil shale; relation of economic geology to hydroelectric power resources.

Venezuela. Geological Excursions in Venezuela (Excursiones Geológicas en Venezuela), E. Cortese. Revista del Colegio de Ingenieros de Venezuela, vol. 2, no. 18, June 1924, pp. 83-91, 1 fig. Details of Carúpano and its surroundings, La Guaira, Catia, Caracas; ore seams, coal formation, etc.

GEOPHONES. See MINE SIGNALING, Geophones; WATER WORKS, Geophones, Use of.

GEOPHYSICS. See MINING, Geophysics in.

GERMANIUM

Atomic Weight of. A Revision of the Atomic Weight of Germanium. The Analysis of Germanium Tetrachloride, G. P. Baxter and W. C. Cooper, Jr. Am. Acad. Arts & Sci.—Proc., vol. 59, no. 10, May 1924, pp. 235-255, 3 figs. Describes method for purification of germanium tetrachloride from arsenic trichloride by fractional distillation in exhausted vessels. Atomic weight of germanium has been found to be 72.60 by analysis of germanium tetrachloride.

GIRDERS

Bending Line, Determination. Graphic Determination of the Bending Line of Members under Compression Based on a Hydrostatic Comparison (Zeichnerische Ermittlung der Biegungslinie gedrückter Stäbe auf Grund eines hydrostatischen Gleichnisses), L. Kulka. Bauingenieur, vol. 5, ons. 5 and 6, Mar. 15 and 31, 1924, pp. 116-121 and 145-149, 12 figs. Method for graphically determining elastic line of solid-web girders under compression.

Calculation. Graphic Tables for Rapid Calculation of Statically Indeterminate Plain Girders and Frames (Graphische Hilfstafeln zur schnellen Berechnung statisch unbestimmter vollwandiger Träger und Rahmen), G. Worch. Beton u. Eison, vol. 23, nos. 16 and 17, Aug. 20 and Sept. 5, 1924, pp. 223-226 and 235-236, 14 figs. Discusses use of alignment charts for intermediary calculations and gives diagrams for calculating influence lines. Numerical examples.

Second Paper on the Calculation of Girders (Second mémoire sur le calcul des colonnes), L. Lemaire. Revue Universelle des Mines, vol. 3, nos. 3, 4, 5, and 6, and vol. 4, nos. 1 and 2, Aug. 1, 15, Sept. 1, 15, Oct. 1 and 15, 1924, pp. 122-142, 193-212, 258-284, 307-323, 17-33, and 89-96, 69 figs. First paper in Annales des Travaux Publics de Belgique, series 2, vol. 22, nos. 1 to 6, 1921, and vol. 23, nos. 1 to 3, 1922. Detailed calculation of wind pressure on walls, etc., in different systems of building construction. Gives numerical tables.

Deflection. Determination of Deflection of Girders of Variable Cross Section (Bestimmung der Durchbiegung von Trägern veränderlichen Querschnitts), Saller. Bauingenieur, vol. 5, no. 20, Oct. 25, 1924, pp. 651-654, 4 figs. Discusses solution of deflection equations by analytical and graphic-analytical methods. From Russian, Technika i Ekonomika, no. 10, 1923.

Deflection-Testing Instrument. The Metrocline. Engineering, vol. 97, no. 3034, Feb. 22, 1924, p. 237, 4 figs. Instrument for ascertaining deflection of bridge girders consists of two main parts, base and deflection rod which slides in vertical pillar standing on base.

Hooks for Lifting. Tests of Some Girder Hooks, H. L. Whittemore and Am. H. Stang. U. S. Bur. Standards—Technologic Paper, no. 260, June 28, 1924, pp. 305-325, 13 figs. Results of tests to determine safety of mild-steel hooks having rectangular cross-sections, used for lifting steel girders.

Latticed. Calculation in the Tracing of Metal Frames (Utilisation du calcul dans le traçage en charpente métallique), A. Bussod. Arts et Métiers, vol. 77, no. 45, June 1924, pp. 227-236, 14 figs. Describes new method in which actual size paper patterns are used and shows its application in girder poles.

Double-Hinged Lattice Frames with Straight Parallel Flanges (Zweigelenk-Fachwerkrahmen mit geraden, parallelen Gurtungen), H. Buchenau. Bautechnik, vol. 2, no. 32, July 25, 1924, pp. 357-359, 3 figs. Simplified calculation of such statically indeterminate wood frames.

Latticed Girders (Gegliederte Knickstäbe), D. Rühl. Bauingenieur, vol. 5, no. 20, Oct. 25, 1924, pp. 671-675, 2 figs. Calculation and structural development of latticed girders. Discusses buckling strength and loads, and shows good agreement between theory and practice.

Latticed Girders Without Diagonal Rods (Poutres à treillis sans diagonales), P. Thomas. Revue Universelle des Mines, vol. 4, no. 4, Nov. 15, 1924, pp. 209-216, 8 figs. Discusses calculation of Vierendeel girders and endeavors to establish simpler formulas and greater degree of accuracy in calculation.

New Type of Wood Joint Using Disk Dowels (Neue Holzverbindung durch Krallenscheibendübel), T. Gesteschi. Deutsche Bauzeitung, vol. 58, no. 42, May 24, 1924, pp. 81-86, 11 figs. Discusses Metzke and Greim method of connection by new kind of dowel; results of tests of latticed girders thus constructed.

Shear, Effect of Taper on. The Effect of Slight Taper on Shear in a Girder, L. N. G. Filon. Engineering, vol. 118, no. 3076, Dec. 12, 1924, p. 789, 2 figs. Results of author's calculations show that taper, even slight, may seriously disturb the de Saint-Venant parabolic distribution of shear over section, although Euler-Bernouilli formula for normal stress remains a good approximation; presents formula which provides simple and easily applied correction to shear over any region in which there exists uniform taper.

Ship. See SHIP DESIGN, Girders.

Transverse Oscillations. Theory of Transverse Oscillations in Girders and Its Relation to Live-Load and Impact Allowances, Chas. E. Inglis. Engineering, vol. 117, no. 3038, Mar. 21, 1924, pp. 378-380. Notes on phenomena attending behavior of girders under influence of dynamical loads. Abstract.) Paper read before Instn. Civ. Engrs.

GLASS

Alkali-Lime. Durability of Alkali-Lime Glass (Ueberblick über die Haltbarkeit der Alkali-Kalk-Gläser), G. Keppeler. Sprechsaal, vol. 57, no. 48, Nov. 27, 1924, pp. 617-622, figs. Reviews various investigations and gives tabular data as to composition, etc., of durable sodium-silicate glasses (for windows and mirrors), alkali-lime-silicate glasses, and alkali-silicate glasses of various durabilities. Graphs of composition of hydrolytic and other glasses.

Alumina, Influence of. Further Investigations of the Influence of Alumina on the Properties of Glass, Violet Dimbleby, S. English, F. W. Hodkin and W. E. S. Turner. Soc. Glass Technology—Jl., vol. 8, no. 31, Sept. 1924, pp. 173-181. Fusibility of glasses containing alumina; observations on melting and working of glasses; physical properties.

Analysis of Raw Materials. Analytical Methods in the Glass Industry, A. Lecrenier. Chem. Trade Jl. & Chem. Engr., vol. 75, no. 1949, Sept. 26, 1924, pp. 363-364. Information relating to laboratory practice at Val-St.-Lambert glass works; estimation of iron in sand; soda and potash products; slaked lime and limestone; estimation of iron and copper in lead oxide; analysis of lead-free glass and of lead-containing glass. Translated from Le Verre.

Colloids in. Colloids in Glass, A. Silverman. Am. Ceramic Soc.—Jl., vol. 7, no. 11, Nov. 1924, pp. 795-802. Discussion of the various elements and compounds found in a colloidal state in glass. Theories and experimental evidence are furnished to account for formation and destruction of colloidal state.

Electrical Conductivity. Correlation Between Crack Development in Glass While Conducting

Electricity and the Chemical Composition of the Glass, E. E. Schumacher. Am. Chem. Soc.—Jl., vol. 46, no. 8, Aug. 1924, pp. 1772-1777, 2 figs. Results of experiments show that tendency to crack increases with increasing alkali content of glass and with increasing electric conductivity.

Electrical Conductivity and Transition Points of Glasses (Ueber die elektrische Leitfähigkeit und Umwandlungspunkte von Gläsern), H. Schönborn. Zeit. für Physik, vol. 22, no. 5, Mar. 28, 1924, pp. 305-316, 5 figs. Variations in electrical resistance of 12 glasses measured over "critical zone" or "annealing range." Law of Hinrichsen and Rasch found to hold, even above softening point, but constants change suddenly at upper and lower limits of critical zone.

Glazing, Specifications for. United States Government Master Specification for Flat Glass for Glazing Purposes. U. S. Bur. Standards—Circular no. 164, June 4, 1924, 12 pp. See also Glass Indus., vol. 5, no. 7, July 1924, pp. 129-132 and Glass Workers, vol. 43, no. 34, May 24, 1924, pp. 11, 20, 22-24, 26, and 29. Specifications adopted Apr. 1, 1924, covering glass for glazing purposes, polished plate glass, clear window glass, wire glass, etc.

Grinding. Glass Grinding at Fisher Body Corporation, E. C. Hughes. Automotive Mfr., vol. 66, no. 9, Dec. 1924, pp. 18-19 and 29, 4 figs. Methods and equipment used in preparation of closed-car body windows; how edges are ground.

Hydration. Hydration of Natural and Artificial Glasses (Ueber die Hydration natürlicher und künstlicher Gläser), G. Schott and G. Linck. Kolloid-Zeit., vol. 34, no. 2, Feb. 1924, pp. 113-116, 5 figs. Measurements of rate at which obsidian, pitchstone, and artificial glasses take up water when finely powdered substances are heated with water at about 250 deg. and 35 atmos. pressure; results suggest that process of taking up water is not usually one of chemical combination, but of inhibition by a gel.

Molten, Electrical Conductivity of. The Electrical Conductivity of Sodium Chloride in Molten Glass, W. J. Sutton and A. Silverman. Am. Ceramic Soc.—Jl., vol. 7, no. 2, Feb. 1924, pp. 86-104, 4 figs. Results of investigation undertaken primarily to show that sodium chloride ionizes in molten glass as it does in aqueous solution, and also when pure salt is heated to temperatures at or above its melting point. Bibliography.

Optical. Optical Glass: A Strategic Raw Material, H. K. Rutherford. Army Ordnance, vol. 5, no. 25, July-Aug. 1924, pp. 423-426 and 481. Discusses source of supply, domestic manufacturing facilities, conservation and strategic importance.

Organic. Pollopas—Organic Glass. A New Synthetic Colloid, F. Pollak and K. Ripper. Chem. Age (N. Y.), vol. 32, no. 10, Oct. 1924, pp. 409-412. New condensation product of urea and formaldehyde recently evolved by authors; material closely resembles rock crystal, flint glass or lead glass in appearance, but with remarkable difference that it can be cut and worked ont a lathe; soluble intermediate products obtained are called Shellan solution; colloid-chemical investigation; further developments; properties of new colloid material; Shellan solutions which may be employed as lacquers and adhesives.

Physical Properties. The Physical Properties of Glasses (Die physikalischen Eigenschaften der Gläser), F. Eckert. Jahrbuch der Radioaktivität u. Elektronik, vol. 20, no. 2-3, Feb. 14, 1924, pp. 93-275, 24 figs. Optical properties; electric, mechanical and thermal properties. Classified bibliography.

Surface Irregularities Determination, Instrument for. The Umbrascope, C. D. Spencer and A. E. Badger. Glass Indus., vol. 5, no. 7, July 1924, pp. 119-121, 6 figs. Describes instrument for determination of surface irregularities of transparent, light wall, glass containers.

Titania, Influence of. Some Observations on the Influence of Titania on the Properties of Glass, A. R. Sheen and W. E. S. Turner. Soc. Glass Technology—Jl., vol. 8, no. 31, Sept. 1924, pp. 187-205, 8 figs. Preliminary experiments on fusibility of mixtures containing titania; colors of titania-containing glasses; preparation and composition of glasses studied; analysis of glasses; influence of titania on annealing temperature; its influence on dispersion.

Viscosity. The Effect of Composition on the Viscosity of Glass, S. English. Soc. Glass Technology—Jl., vol. 8, no. 31, Sept. 1924, pp. 205-248 and (discussion) 248-251, 11 figs. Investigation of series of glasses at temperatures extending up to 1400 deg.

GLASS MANUFACTURE

Automobile Plate Glass. River Rouge Automobile Plate Glass Factory, J. W. Robinson. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 376-379, 7 figs. Describes glass works recntly constructed for Ford Motor Co. Has annual capacity of 10,000,000 sq. ft. of automobile glass. Solid walls and roof of steel sash and wire glass dictated by lighting and ventilation requirements. Conveyors make operations mechanical.

The Manufacture of Plate Glass for Automobile Uses, J. H. Fox. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 449-455. History of glass making; manufacturing polished plate glass; melting pots; pot furnaces; batch materials; casting the metal; annealing the plates; examination and cutting of rough plates; grinding and polishing; continuous process for making polished plate glass; quality desired in automobile glass; thickness specifications; salvage of waste glass.

The River Rouge Plate Glass Plant of the Ford Motor Company, F. J. Huntley. Glass Indus., vol. 5, no. 7, July 1924, pp. 122-124, 4 figs. Describes new factory in operation.

Calculations. Principles of Glass Making, R. R. Shively. Ceramist, vol. 4, no. 4, July 1924, pp. 237-243. Simple classification of raw materials used in glass making, including method of calculating amount of one material necessary to replace chemically any other.

Colored Glass. Colored Glasses in Hollow Glass Works, C. Duvivier. Glass Industry, vol. 5, no. 12, Dec. 1924, pp. 229-231. Deals with blue, green, violet, yellow, dichroic and red glass.

The Production of High Grade Colorless Glass in Tank Furnaces, G. O. Smith. Glass Industry, vol. 5, no. 1, Jan. 1924, pp. 1-2. Deals with use of selenium as a decolorizer for flint glass in tanks, discussing factors which are important in ascertaining amount necessary under different conditions.

Combustion Problems. See COMBUSTION, Problems.

Containers, Specifications for. Specifications in the Glass Industry, with Special Reference to Soda-Lime Glasses for Glass Containers, W. E. S. Turner. Soc. Glass Technology—Jl., vol. 8, no. 29, Mar. 1924, pp. 3-12 and (discussion) 12-30. Suggestions for specification for glass manufacturers. Discusses essentials which each type of container should possess, essentials which are not obvious to purchaser, and therefore require that they shall be laid down by technical workers.

Devitrification. Devitrification Phenomena in Practice in Glass-Factory Operation (Ueber die Entglasungsercheinungen in der Praxis der Glashütten-Betriebe), J. Knoblauch. Sprechsaal, vol. 57, no. 21, May 23, 1924, pp. 234-240, 16 figs.;

also (translation) in Glass Industry, vol. 5, nos. 11 and 12, Nov. and Dec. 1924, pp. 206-210 and 232-233, 11 figs. Discusses devitrification phenomena caused by temperature variations and illustrates devitrified structures produced in actual practice under influence of temperature in glass mass in furnace.

Engineering Problems. The Past and Future of Glass Technology (Glastechnik in Vergangenheit und Zukunft), H. Schulz. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 21, May 24, 1924, pp. 505-508. Influence of modern chemistry, progress in firing and finishing; modern glass engineering based on physico-chemical principles; future problems.

Flat Glass. Flat Glass, A. E. Fowle. Glass Industry, vol. 5, no. 6, June 1924, pp. 99-104, 2 figs. Early history of flat glass; development of flat glass in America; hand process; Colburn developments; Libbey-Owens process; etc.

Fuel Economy in. Fuel Economy, H. W. Seldon. Ceramist, vol. 5, no. 2, Nov. 1924, pp. 105-117. Discusses fuel economy in glass plants. Summary of operating instructions with explanation of each illustrating important points to be recognized and established; pyrometers and other instruments; fuel combustion; kinds of fuel and burning; gas producers.

Furnace Refractories. See REFRACTORIES, Glass-Furnace.

Furnaces. Calculation of Stacks for Glass Furnaces (Schornsteinberechnungen für Glasschmelzöfen), O. Maetz. Sprechsaal, vol. 57, no. 21, May 23, 1924, pp. 243-249, 5 figs. Determination of dimensions on exact precalculation, gives graphs for draft at given heights, utility of waste gases.

Design of a 14-Pot Recuperative Glass Furnace, E. W. Koering. Glass Industry, vol. 5, no. 6, June 1924, pp. 105-109, 3 figs. A common method of designing a recuperative glass furnace.

Thermotechnical Investigation of Glass Furnaces (Wärmetechnische Untersuchungen am Glassofen), G. Gehlhoff, O. Ricklefs and W. Schreiber. Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 278-287, 4 figs. Efficiency of open Siemens furnace with step grate referred to maximum heating value is 65 per cent in firing brown coal. Determination of heat balance.

Fused Silica Glassware. The Manufacture and Uses of Fused Silica Glasswares. Ceramist, vol. 4, no. 1, Apr. 1924, pp. 36-43. Manufacture of opaque and of transparent silica wares; comparison of properties of fused silica and hard porcelain.

Gas, Use of. Using Gas in the Glass Industry (Die Gasverwendung in der Glasindustrie), K. Otto. Gas- u. Wasserfach, vol. 67, nos. 50 and 51, Dec. 13 and 20, 1924, pp. 753-755 and 772-775, 10 figs. Development of glass industry due to use of gas; gas-fired regenerative furnaces; production of generator gas for furnaces; application of gas in production processes of various glass articles.

Glassware Temperatures Determination. Determination of Glassware Temperatures, J. Voorhies. Fuels & Furnaces, vol. 2, no. 7, July 1924, pp. 679-681. Describes method offering means by which temperature of glassware, bottles, etc., leaving mold may be obtained with fair degree of accuracy.

Laboratory Analyzing Methods. Methods of Analysis of the Laboratory of the Crystal Glass Works at Val-Saint-Lambert, A. Lecrenier. Glass Industry, vol. 5, no. 10, Oct. 1924, pp. 187-189. Description of methods which have been used for about 15 years in laboratory of crystal glass works of Val-St.-Lambert, Belgium, for analysis of sand, soda ash, potash, limestone, lead, glass, nitrate of potash, nitrate of soda, manganese, and hydrofluoric acid. Translated from Verre, vol. 4, June 1924, pp. 125-129.

Optical Glass. Production and Properties of Optical Glass (Herstellung und Eigenschaften des optischen Glases), F. Weidert. Praktische Maschinen-Konstrukteur, vol. 57, nos. 26 and 30, July 15 and Aug. 12, 1924, pp. 375-379, and 425-428, 9 figs. Development of Sendlinger optical glass works, main points in judging optical glass, details of production, chemical and physical properties of optical glass; ceramic, chemical, fusion and physical laboratories and their work.

Plate Glass. See Automobile Plate Glass.

Pot Clays. See CLAY PRODUCTS, Glass-House Pots.

Principles. Principles of Glass Making, R. R. Shively. Ceramist, vol. 4, nos. 5 and 6, Aug. and Sept. 1924, pp. 287-293 and 371-374. Aug.: Recent glass developments, their cause and effect. Sept.: Use of selenium in glass.

Pyrometers, Use in. See PYROMETERS, Glass Furnaces.

Sheet-Glass Drawing, Fourcalt Process. The Fourcalt Process of Drawing Sheet Glass at Clarksburg. Glass Industry, vol. 5, no. 4, Apr. 1924, pp. 59-68, 18 figs. Description of process and new plant of Am. Sheet Glass Co. at Clarksburg, W. Va.

Tank Operation. Operating Glass Tanks, B. Schieldrop. Fuels & Furnaces, vol. 2, nos. 3, 4, and 5, Mar., Apr., and May, 1924, pp. 261-264, 367-369, and 467-469, 6 figs. Regenerators, ports and reversing valves; radiation losses.

Thermos Bottles. Examination and Evaluation of Thermos Bottles [Prüfung und Bewertung von Isolierflaschen (Wärmeschutzflaschen)], M. Jakob. Gesundheits-Ingenieur, vol. 47, no. 30, July 26, 1924, pp. 321-323, 3 figs. Discusses methods for determining efficiency of thermos bottles and gives formulas for purpose.

Thermotechnical Measurements. Thermotechnical Measurement in Glass Factories (Vom wärmetechnischen Messwesen in Glashütten), H. Maurach. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 21, May 24, 1924, pp. 520-524, 15 figs. Practical experiences and improvements; temperature-measuring instruments for temperatures above 1000 deg. cent.; gas-pressure measurements and regulators; gas investigations and automatic gas testers.

Tubes. Mechanical Drawing of Tubes (Mechanisches Röhrenziehen), H. Thiene. Sprechsaal, vol. 57, no. 21, May 23, 1924, pp. 250-251, 7 figs. Discusses German patent 384,796 and Austrian patents 89,670 and 89,671, describing simple process for mechanical drawing of glass tubes, owned by Libbey Glass Co., Toledo.

Wire Glass. The Manufacture of Wire Glass (Die maschinelle Herstellung von Drahtglas), R. Simon. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 21, May 24, 1924, pp. 509-514, 28 figs. Historical development of manufacturing processes; special constructions of rolling devices; plates, rolling out between rolls; wire glass; advantages and disadvantages of Appert and Shuman processes; special constructions of rolling devices; rolling tables and machines; universal glass-rolling machine; future prospects.

GLASS WORKS

Materials Handling in. See MATERIALS HANDLING, Glass Plants.

GLIDERS. See AIRPLANES, Gliders.

GLUES

Adhesive Power. Adhesive Power of Glue and Gelatin (Ueber die Klebkraft von Leim und Gela-

tine), O. Gerngross and H. A. Brecht. Zeit. für angewandte Chemie, vol. 37, no. 43, Oct. 23, 1924, pp. 847-848, 1 fig. States that adhesive power of gelatins is much higher than that of technical glues of same concentration. Results of tests of glues and gelatins.

Manufacture. Value of Systematic Examination in Glue Manufacture (Ueber den Wert systematischer Untersuchungen in der Leimfabrikation), E. Sauer. Chemiker-Zeitung, vol. 48, nos. 83 and 86, July 10 and 17, 1924, pp. 473-475 and 500-501. Discusses properties of leather and bone glues, viscosity measurement, effect of heat and steam under pressure on glue solutions, etc., and gives results of tests.

GLYCERINE

Use in Hydraulic Machinery. See HYDRAULIC MACHINERY, Glycerine, Use in.

GOLD

Deposits. See GOLD DEPOSITS.

Metallurgy. See GOLD METALLURGY.

Mines. See GOLD MINES.

Mining. See GOLD MINING.

Production, Canada. Canada as a Gold Producer, L. D. Huntoon. Min. & Metallurgy, vol. 5, no. 211, July 1924, pp. 315-322, 8 figs. World's gold production. Analysis of Canada's gold production. Railroad building keeping up with prospectors.

Soldering. See SOLDERING, Gold and Silver.

GOLD DEPOSITS

Austria. Goldfield of the Eastern Alps (Das Goldfeld der Ostalpen und seine Bedeutung für die Gegenwart), R. Canaval. Berg- u. Hüttenmännisches Jahrbuch, vol. 72, no. 2, 1924, pp. 25-48. Details of gold fields of Masse, Bohemia, and central Alps between meridians of Zell and Ziller.

British Columbia. Hillsbar Gold Claims, Yale District, B. C., C. E. Cairnes. Can. Dept. Mines, Geol. Survey, no. 2031, summary report, 1924, part A, pp. 81A-83A. There are eight claims in two parallel and adjoining rows of four claims each; rocks represented include slate, granodiorite, and occasional porphyritic dykes.

California. The Gold Ores of Grass Valley, California, E. Howe. Economic Geology, vol. 19, no. 7, Nov. 1924, pp. 595-619 and (discussion) 619-622, 4 figs. Evidence is presented that leads to conclusions that quartz veins were formed by replacement; it is shown that introduction of gold followed fracturing of quartz due to slight movements on vein fissures and that occurrence of ore in shoots is to be attributed largely to this mechanical cause.

Dutch Guiana. The Goldfield of Dutch Guiana, B. W. Holman. Min. Mag., vol. 30, no. 2, Feb. 1924, pp. 85-89, 5 figs. Description of goldfields, and method of testing deposits.

Idaho. Geology and Gold Resources of North Central Idaho, F. A. Thomson and S. M. Ballard. Idaho Bur. Mines of Geology—Bul., no. 7, 1924, 127 pp., 53 figs. Geography, physiography, and geology; rocks of area; dikes and veins; minerals and ore deposits; lode mining districts and typical properties.

Nova Scotia. Nova Scotian Geology, S. Brunton. Can. Min. Jl., vol. 45, no. 29, July 18, 1924, pp. 689-693, 15 figs. See also Min. Mag., vol. 31, no. 6, Dec. 1924, pp. 339-342, 1 fig. Discusses gold field geology and advocates more scientific methods of investigation hitherto neglected as basis of future research and development.

Ontario. Notes on the Geology and Ore Occurrences of the Porcupine Goldfield, R. C. Feilding. Instn. Min. & Metallurgy—Bul., nos. 232, 234, and 251, Jan., Mar., and June, 1924, 20 pp., 8 pp., and 17 pp., 2 figs.

Quebec. Extension of the Porcupine Gold Belt Into Quebec, D. G. H. Wright and W. E. Segsworth. Eng. & Min. Jl.-Press, vol. 117, no. 19, May 10, 1924, pp. 763-764, 1 fig. Geology of Quebec extension of northern or Porcupine gold belt, a district which seems to warrant intensive prospecting.

The Arntfield Prospect. Can. Min. Jl., vol. 45, no. 19, May 9, 1924, pp. 449-450, 2 figs. Discovery, development, financing, and description of gold property in northwestern Quebec.

The Goldfields of North-Western Quebec, S. Brunton. Min. Mag., vol. 31, no. 2, Aug. 1924, pp. 137-146, 7 figs. General account of a new gold region in Canada which is at present attracting much attention, including geology, properties developed, legislation, travel routes, health regulations and official surveys.

Queensland, Australia. Report on Thanes Creek and Talgai Goldfields, Warwick, J. H. Reid. Queensland Govt. Min. Jl., vol. 25, no. 293, Oct. 1924, pp. 365-366. Present conditions; prospects of field.

Siberia. The New Gold-Bearing Districts of East Siberia, V. Obruchev. Russian Min. Jl., vol. 100, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 2-7, 162-169, and 283-291, 2 figs. (In Russian.)

The Selemdja Alluvial Gold Deposits, Amur Province, Eastern Siberia, G. T. Eve. Min. Mag., vol. 31, no. 4, Oct. 1924, pp. 201-205, 2 figs. Account of gold deposits on Selemdja River and its tributaries, chief center of gold mining in Amur Province, with notes of past and present scales of operation.

South Africa. The Leeuwpoort Gold Area. S. African Jl. of Industries, vol. 7, no. 4, Apr. 1924, pp. 211-218. Report made to Minister of Mines and Industries on gold values and possibilities of mining development in area lying immediately to east of farm Leeuwpoort, South Africa.

GOLD METALLURGY

Anodic Oxidation. Anodic Gold Oxidation (Ueber anodische Goldoxydation), F. Jirsa and H. Jelinek. Zeit. für Elektrochemie, vol. 30, no. 6, June 1924, pp. 286-289, 2 figs. By means of equilibria in solubility of auric hydroxide in sulphuric acid of varying concentrations, determination is made of solubility product of this hydroxide; describes method followed.

Chlorination. Electro-Cyanide Mill of the Oatman United. Ariz. Min. Jl., vol. 8, no. 12, Nov. 15, 1924, pp. 3-4, 2 figs. Describes Sill and Sill method of recovering values by electrocyanide, chlorination process which is being installed at new mill of Oatman United Gold Min. Co.

Concentration. The Concentration of Gold-Copper Ores by Froth Flotation at Tul Mi Chung. The Seoul Mining Company, Korea, R. J. Lemmon. Instn. Min. & Met.—Bul., no. 235, Apr. 1924, 37 pp., 5 figs. Further contributed remarks on this paper.

Cyanidation. A Research to Determine the Size of the Gold Particles in the Witwatersrand Banket Ore and Their Rate of Solution in Cyanide, K. L. Graham and F. Wartenweiler. Chem., Met. & Min. Soc. S. Africa—Jl., vol. 24, no. 12, June 1924, pp. 285-291 and (discussion) 291-292, 6 figs. See also Instn. Min. & Met.—Bul., no. 239, Aug. 1924, 8 pp. 7 figs., partly on supp. plates. Results of research; it is concluded that particles of gold are irregular in shape with generally rounded contours, and that in grinding

process employed, they are reduced in size in accordance with extent of grinding and completeness of means of classification which continually returns the oversize for further comminution.

Calcined Dolomite as a Substitute for Lime in the Recovery of Gold and Silver by the Cyanide Process, E. S. Leaver, C. W. Davis and J. A. Woolf. U. S. Bur. Mines—Reports of Investigations, no. 2648, Oct. 1924, 7 pp. See also Pit & Quarry, vol. 9, no. 4, Nov. 15, 1924, pp. 95-98. Results of experiments to determine value of calcined dolomite as substitute for lime in cyaniding gold and silver ores; it is concluded that calcined dolomite should not be purchased for this purpose without thorough investigation as to its action on ore to be treated and its effect on all operations connected with plant practice.

Continuous Vacuum Filters in Cyaniding, B. D. Kelly. Eng. & Min. Jl.-Press, vol. 118, no. 15, Oct. 11, 1924, pp. 569-573, 5 figs. Success of filtration of decantation tailings at Hollinger inspires further work; series filtration now used at Argonaut (Ont.); flow sheets suggested.

"Protective Alkalinity," and the Use of Alkali, in Cyanidation, J. R. H. Robertson. Instn. Min. & Metallurgy—Bul., no. 242, Nov. 1924, 23 pp. Results of experience in treatment and testing of materials bearing gold and silver.

Cyanide Solutions, Dissolved Oxygen Determination. Determination of Dissolved Oxygen in Cyanide Solutions, A. J. Weinig and M. W. Bowen. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1361-M, Sept. 1924, 9 pp., 4 figs. Describes method which is a modification of Schutzenberger's whereby solution in titrations and standards are protected from atmosphere by a layer of kerosene. Indigo-disulphonate is indicator and sodium hydrosulphite standard.

Ore Treatment. Mining and Milling Rich Gold Ore on Chichagof Island (Alaska), H. N. Baumann, Jr. Eng. & Min. Jl.-Press, vol. 117, no. 22, May 31, 1924, pp. 876-879, 5 figs. Company operating deposit recovered gold, free but finely divided, by amalgamation and flotation concentration. Shut down in July 1923, mine recently has been reopened.

Treatment of Gold-bearing Quartz of the Kolar Gold Field, R. H. Kendall and A. F. Hosking. Instn. Min. & Metallurgy—Bul., no. 242, Nov. 1924, 39 pp., 19 figs. Practice now in vogue at Mysore, Champion Reef, Ooregum, Nundydroog, and Balaghat mines, as regards treatment of current ore and in re-treatment of accumulated tailings.

Recovery from Pyrrhotite-Containing Ores. The Recovery of Gold and Silver From Ore Containing Pyrrhotite, W. H. Goodchild and F. L. Wilder. Min. Mag., vol. 31, nos. 1, 4, and 5, July, Oct. and Nov. 1924, pp. 18-21, 208-211, and 285-288. July: Hidden dangers of pyrrhotite group of minerals as they affect gold and silver mining. Oct.: Various means whereby difficulties may be successfully surmounted. Nov.: Seven principal points to be considered in extracting precious metals from pyrrhotite-bearing ore.

South Africa. Gold Metallurgy in the Union of South Africa, H. A. White. So. African Eng., vol. 35, nos. 6 and 7, June 30 and July 31, 1924, pp. 113-114 and 146-147. Account of present position and future prospects; practice in crusher-house and sorting plant, mill, tube mills, and plate-house, cyanide works, slime plant and floating gold leaf.

Washing Auriferous Gravel. Practical and Theoretical Study of the Washing of Auriferous Gravel in Mining District of Kilo-Moto (Belgian Congo) (Etude pratique et théorique du lavage des gravures aurifères, etc.), R. Anthoine, M. Gomrée and R. de Lannoy. Revue Universelle des Mines, vol. 67, no. 1, Jan. 1, 1924, pp. 19-37, 12 figs. Results of prolonged investigation at Uélé mines.

GOLD MINES

Africa. The Shamva Gold Mine, J. M. Maclaren. Min. Mag., vol. 31, no. 6, Dec. 1924, pp. 329-339, 6 figs. Report on geology of Shamva gold mine, Rhodesia, made for Gold Fields Rhodesian Development Co., Ltd.

Australia. Sons of Gwalia Gold Mine, W. A. Chem. Eng. & Min. Rev., vol. 16, no. 183, Dec. 5, 1923, pp. 95-97. History of mine, surface equipment, and ore treatment.

The Ortona Gold Mines, O. M. Williams. Queensland Govt. Min. Jl., vol. 25, no. 286, Mar. 15, 1924, pp. 87-88. Geology, and work in progress.

British Columbia. The Windpass Gold Mine, Chu Chua, B. C., W. L. Uglow. Can. Min. Jl., vol. 45, no. 2, Jan. 11, 1924, pp. 47-49, 4 figs. Location, topography, history, geology, and description of Windpass vein.

Germany. Gold Mining in Germany, S. P. Grosse. Eng. & Min. Jl.-Press, vol. 117, no. 19, May 10, 1924, p. 765. Old properties in Bavaria reopened by Fichtelgold Co.

Japan. Geology of the Sadi Gold Mine, in Japan, H. Nishihara. Eng. & Min. Jl.-Press, vol. 118, no. 4, July 26, 1924, pp. 137-138, 3 figs. Gives geology of mine.

Manitoba. The Bingo Mine. Can. Min. Jl., vol. 45, no. 40, Oct. 3, 1924, pp. 981-983. Details of development work, mill, and tests of mine situated in Northern Manitoba.

Ontario. Electric Load at McIntyre-Porcupine Mines, A. R. Webster. Can. Min. Jl., vol. 45, no. 7, Feb. 15, 1924, pp. 151-153, 1 fig. Power required, and description of electric equipment.

Quebec. Developments in the Quebec Gold Belt, W. M. Goodwin. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 188-198, 3 figs. Gold mining and agriculture; general geology; gold occurrences; principal properties now being developed.

Noranda Mines. Can. Min. Jl., vol. 45, no. 19, May 9, 1924, pp. 455-458, 4 figs. First annual report of this exploration company, describing Horne and Chadbourne gold properties in northwestern Quebec.

The Rouyn-Boischatel Gold Area. Can. Min. Jl., vol. 45, no. 15, Apr. 11, 1924, pp. 346-348, 3 figs. Notes on operating properties in gold district of northwestern Quebec.

The Rouyn Gold Area, W. M. Goodwin. Can. Min. Jl., vol. 45, no. 43, Oct 24, 1924, pp. 1049-1052, 5 figs. In northwestern Quebec. Account of preparations for winter work, transportation facilities, administration of Quebec mining act, and features that are an integral part of development of any mining district.

Rhodesia. The Shamva Mines, Rhodesia, C. E. Parsons. Instn. Min. & Met.—Bul., no. 234, Mar. 1924, 10 pp., 2 figs. on supp. plates. See also (discussion) no. 235, Apr. 1924, 3 pp. Brief description of deposit: data on mining practice, tramming, ore treatment, sampling, working expenses, prospecting, etc.

Venezuela. The Goldfields of El Callao. Min. Jl., vol. 146, no. 4639, July 19, 1924, pp. 589-590. Revival due to promising discoveries enabling mines to be opened up with good results. Details of geology and present operations.

GOLD MINING

Alaska. Estimation of Ore Reserves and Mining Methods in Alaska Juneau Mine, P. R. Bradley. Am. Inst. Min. & Met. Engrs.—Trans., no.

1329-M, Mar. 1924, 19 pp., 2 figs. Brief history of mining and milling operations in Juneau gold belt, and description of geology of district, followed by discussion of problem of sampling gold ores, and mining methods used.

Australia. Gold Mining at Brookfield, C. C. Morton. Queensland Govt. Min. Jl., vol. 25, no. 288, May 15, 1924, pp. 169-172, 1 fig. Gives geology and general description of mine.

Colorado. Mining Methods of the Telluride District, C. N. Bell. Am. Inst. Min. & Met. Engrs.—Trans., no. 1295-M, Feb. 1924, 15 pp., 2 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 206, Feb. 1924, pp. 91-93, 2 figs. Geology of district in southwestern Colorado, and methods employed, including filled stope, shrinkage stope, timbering, hoisting, etc.; power, sorting, explosive, labor, and other costs.

Dredges. See DREDGES, Diesel-Electric; DREDGING, Gold.

Nevada. Mining Methods at Gold Hill, Nevada, G. J. Young. Eng. & Min. Jl.-Press, vol. 117, no. 23, June 7, 1924, pp. 916-921, 11 figs. Description of United Comstock's underground operations.

Siberia. Methods of Gold Mining in Eastern Siberia, A. P. Sviridoff. Eng. & Min. Jl.-Press, vol. 118, no. 7, Aug. 16, 1924, pp. 251-258, 9 figs. Gives methods and cost of prospecting and working mines in gold-mining districts of Eastern Siberia.

South Africa. How Gold Mining on the Rand Has Made History, O. Letcher. Compressed Air Mag., vol. 29, no. 10, Oct. 1924, pp. 1030-1033, 9 figs. Points out that present rate of output of greatest gold field and largest mining camp amounts to 55 per cent of world's current production; methods employed.

GOVERNORS

High-Speed Steam Engines. The Governing of High-Speed Steam Engines. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 25-27, 3 figs. Notes advocating expansion or cut-off governors, stating case according to experience of W. Sisson & Co.

Hydraulic-Turbine. See HYDRAULIC TURBINES, Governors.

Speed-Responsive, Test Code for. Test Code for Speed-Responsive Governors. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 713-716, 1 fig. Preliminary draft of special supplementary code formulated by A. S. M. E. committee on Power Test Codes.

Steam-Engine. See STEAM ENGINES, Governors.

Steam Haulage Engines. The Governors of Steam Haulage Engines (Die Fahrtregler der Dampffördermaschinen), H. Hoffmann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 47, Nov. 22, 1924, pp. 1214-1218, 10 figs. Supplementary to author's previous article published in same journal, vol. 66, 1922 (see reference in Eng. Index 1922, p. 313); discusses flow regulation and describes operation and construction of Iversen governor in particular.

GRAIN ELEVATORS

Explosions. Dust Explosions in Grain Elevators, D. J. Price. Wld. Ports, vol. 12, no. 6, Apr. 1924, pp. 47-72 and (discussion) 72-78, 6 figs. Discusses causes of explosions in grain elevators and some methods of control and prevention. Value of educational work.

Mechanical and Pneumatic. Mechanical and Pneumatic Grain Elevators (Mechanische und pneumatische Elevatoren für Getreide), Mangold. Fördertechnik u. Frachtverkehr, vol. 17, no. 4, Feb. 21, 1924, pp. 41-45, 11 figs. Describes different types of both systems and makes suggestions for choice of system.

Pneumatic Grain Elevators, W. Cramp and A. Priestley. Engineer, vol. 137, nos. 3550, 3551, 3552, and 3553, Jan. 11, 18, 25, and Feb. 1, 1924, pp. 34-36, 64-65, 89-90, and 112-113, 7 figs. Results of investigation at University of Manchester; suggests rational basis for future design. Jan. 11: Force exerted by air on grain and resulting velocities; grain velocity and air pressure. Jan. 18: Work on pneumatic conveyor and other work done by air; experimental plant used in tests of vertical pneumatic elevator. Jan. 25: Friction of grain on pipe; nozzles. Feb. 1: General method for design of plants; use of auxiliary air inlet in nozzles; application of formulas to other materials and media and to problem of horizontal conveyors.

Unloading and Milling Plant. Granary in Harbor of Flensburg, Germany (Der Speicherbau am Freihafen in Flensburg), G. Luther. Fördertechnik u. Frachtverkehr, vol. 17, no. 4, Feb. 21, 1924, pp. 52-56, 9 figs. Describes new building for unloading and milling of grain, with details of layout and mechanical equipment.

GRAIN HANDLING

Car Dumper for. Grain Elevator Operation with Automatic Box Car Unloader. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 732-737, 6 figs. Installation of new dumping device at Port Arthur, Can. Nat. Rys., effects large savings in costs of unloading grain from box cars.

Lake Terminal. Terminal Operation at Ft. William, Ontario. Ry. Rev., vol. 75, no. 23, Dec. 6, 1924, pp. 901-907, 6 figs. Methods employed by Can. Nat. Rys. in handling grain traffic large in volume and seasonal in character at lake terminal.

Railway Transportation. Moving the Crop, Canadian Pacific Railway, E. D. Cottrell. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 697-700, 5 figs. Method of handling grain through Winnipeg and North Transcona during rush season.

GRANDSTANDS

Concrete. See CONCRETE CONSTRUCTION, REINFORCED, Grandstands.

Seating Area, Design of. The Design of Seating Areas for Visibility, A. B. Randall. Am. Architect & Architectural Rev., vol. 125, no. 2446, May 21, 1924, pp. 487-493, 8 figs. A mathematical method of section design.

GRANITES

France. Granites of the Vosges Mountains (Les granits des Vosges), M. Darras. Revue des Materiaux de Construction et de Travaux Publics, no. 179, Aug. 1924, pp. 57M-62M, 8 figs. Describes operations of quarrying, sawing, polishing, etc., of granites, equipment used, monumental work, etc.

Norwegian Industry. The Granite Industry. Norwegian Trade Rev., no. 5, 1924, pp. 65-69, 4 figs. Norwegian stone quarrying early times. Origin and growth of granite industry. Present position and prospects.

Quarrying. See QUARRYING, Granite.

GRAPHITE

Artificial. Effect of Heat and Vacuum on Artificial Graphite (Action de la chaleur et du vide sur le graphite artificiel), P. Lebeau and M. Picon. Académie des Sciences—Comptes rendus des séances, vol. 179, no. 4, July 28, 1924, pp. 264-266. Heated in vacuum volatilization of carbon occurs at 2300 deg. and at 2400 deg. becomes rapid enough to render graphite tube useless.

Bavaria. Graphite Mining in Bavaria (Neues vom niederbayerischen Graphitbergbau), W. Landgraeber. Metall u. Erz, vol. 21, no. 24, 2nd Dec. no., 1924, pp. 582-584. Discusses recent geologic views of deposits, mining operations, impurities, production of commercial graphite by enriching with C up to 99 per cent, electrochemical production in airtight furnaces, etc.

Crystal Structure. Crystal Structure of Graphite (Ueber die Kristallstruktur des Graphits), O. Hassel and H. Mark. Zeit. für Physik, vol. 25, no. 4-6, Aug. 4, 1924, pp. 317-337, 5 figs. By combination of several X-ray interference methods structure of graphite crystals was examined and determined.

Density. Density of Graphite (Ueber die Dichte des Graphits), E. Ryschkewitsch and E. Köstermann. Zeit. für Elektrochemie, vol. 30, no. 2, Feb. 1924, pp. 86-88. Density of graphite after fusing and solidifying is 2.232 ± 0.0013 at 16 deg.

German. Graphite (Graphit), E. Herm. Bergbau, vol. 37, no. 18, Sept. 4, 1924, pp. 514-517. Occurrence of graphite in various countries and Germany. Production and uses of German graphite.

Industrial Uses. Graphite and Its Industrial Uses (Le graphite et ses emplois dans l'industrie), G. Mesnard. Génie Civil, vol. 84, nos. 6 and 7, Feb. 9 and 16, 1924, pp. 138-139 and 161-164, 6 figs. Study of natural graphite, its properties, geographical occurrences, mining, and uses.

Marketing. Marketing of Graphite, Charles Pettinos. Eng. & Min. Jl.-Press, vol. 117, no. 26, June 28, 1924, pp. 1036-1038, 3 figs. Principal sources are Ceylon and Madagascar; domestic supplies negligible.

Metallic Carbon Modification. Graphite as a Metallic Modification of Carbon (Graphit als metallische Kohlenstoffmodifikation), E. Ryschkewitsch. Chemiker-Zeitung, vol. 48, no. 25, Feb. 27, 1924, p. 101. Points out great similarity in physical properties between graphite and metals in its opacity, luster, power of reflecting light without selective absorption, electrical and thermal conductivity; it is insoluble in any solvent, except molten metals, without undergoing chemical change; like metals, its atom contains free electrons which confer on it its thermal and electrical conductivity.

Production. Graphite (Graphit). Bergbau, vol. 37, nos. 19 and 20, Sept. 18 and Oct. 2, 1924, pp. 535-538 and 564-568. Applications; methods of enriching raw products to 60-90 per cent C; flotation of ores; electrothermic process; graphite in Germany, Austria and Bavaria.

Graphite in 1923, J. Middleton. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:12, Oct. 17, 1924, pp. 91-97. Production; exports and imports; prices; world's production.

Resistance. See CARBON, Resistance.

GRAVEL PLANTS

Field Conveyors. Gravel Plant with Unusual Field Conveyor, G. M. Earnshaw. Rock Products, vol. 27, no. 16, Aug. 9, 1924, pp. 32-34, 8 figs. Plant of Garaux Bros., Canton, Ohio, uses pivoting conveyors in steel frames to bring in material from shovel.

GRAVITATION

Einstein Theory. A Stationary Cosmology in the Light of Einstein's Gravitation Theory (Ueber eine stationäre Kosmologie im Sinne der Einsteinschen Gravitationstheorie), K. Lanczos. Zeit. für Physik, vol. 21, no. 2, Jan. 30, 1924, pp. 73-110, 4 figs. Points out that for cosmological equations the only stationary solution is the Einstein cylindrical universal; discusses new solution which is compatible with original field equations and with which aprioristic relation between mass and cosmological constants need not be assumed.

Newton's Third Law. Gravitation and Newton's Third Law (La gravitation et le principe de l'égalité de l'action et de la réaction), G. Maneff. Académie des Sciences—Comptes Rendus, vol. 178, no. 26, June 23, 1924, pp. 2159-2961. Author seeks to determine consequence of generalization of Newton's third law to apply to energy as well as to inertia of matter; result of Michelson-Morley experiment, together with Lorentz contraction in length and dilatation in time, appear as consequences of inertia of energy; classical relativity principle would therefore be inapplicable to ordinary mechanics; author shows analytically that when approaching gravitational center, speed of light would decrease proportionally to its rate of approach.

GRAVITY

Practical Application. Study of Gravity and Its Practical Applications (L'Etude de la pesanteur et ses applications pratiques), H. Vigneron. Nature (Paris), no. 2623, July 12, 1924, pp. 24-28, 6 figs. Discusses Cavendish and Eotvös balances, their principle and application.

GREASES

Kinds and Uses. The Kinds and Specialized Uses of Grease, F. A. Hobb. Oil News, vol. 12, no. 1, Jan. 1924, pp. 14-15. Account of grades and individual merits of greases.

GREENHOUSES

Heating. See HEATING, HOT-WATER, Greenhouses.

GRINDING

Automobile Parts. How Nash Motor Parts Are Ground, E. C. Boehringer. Abrasive Industry, vol. 5, no. 4, Apr. 1924, pp. 90-92 and 97, 7 figs. Grinding operations and equipment used at plants of Nash Motors Co., Milwaukee and Kenosha, Wis.

Regrinding of Automobile Parts, F. B. Jacobs. Abrasive Industry, vol. 5, no. 12, Dec. 1924, pp. 296-299, 9 figs. Cylinders are finished to standard oversizes and fitted with new pistons, rings and wrist pins; inspection an important item.

Reo Parts Ground Accurately, F. B. Jacobs. Abrasive Industry, vol. 5, nos. 7 and 8, July and Aug. 1924, pp. 163-167 and 193-197, 19 figs. Grinding methods at plant of Reo Motor Co., Lansing, Mich. Each manufacturing department has its own grinding equipment. Automatic machines used extensively for finishing various units.

Centerless. The New Centerless Method of Grinding, G. W. Binns. West. Machy. Wld., vol. 15, no. 10, Oct. 1924, pp. 335-336, 4 figs. Range and class of work being handled successfully on centerless grinders, an innovation within last few years which has revolutionized art of grinding cylindrical work.

Chatter Marks. Chatter Marks on Ground Surfaces, D. K. Cole. Machy. (Lond.), vol. 24, no. 620, Aug. 14, 1924, pp. 621-622. Their causes and remedies.

Face. Face Grinding From the Rough as a Time Saver, E. Sheldon. Am. Mach., vol. 61, no. 2, July 10, 1924, pp. 43-47, 10 figs. Tells on what kind of work face grinder should be used and points out its economies.

Fine, Theory of. Researches on the Theory of Fine Grinding, G. Martin, C. E. Blyth and H. Tongue. Ceramic Soc.—Trans., vol. 23, part 2, 1923-1924, pp. 61-109, 48 figs. Results of experiments to elucidate law governing connection between number of particles and their diameters in grinding crushed sand.

Glass. See GLASS, Grinding.

Machine-Tool Parts. Grinding Operations Expedite Manufacture of Machine Tools, W. E. Groene. Abrasive Industry, vol. 5, no. 8, Aug. 1924, pp. 189-192, 6 figs. Describes grinding operations carried on at plant of R. K. LeBlond Machine Tool Co., Cincinnati.

Machines. See GRINDING MACHINES.

Methods. Grinding Shop Practice Described, F. B. Jacobs. Abrasive Industry, vol. 5, no. 5, May 1924, pp. 111-115, 11 figs. Methods followed at shops of L. Lawrence Co., Detroit, Mich. Worn cylinders reground and new pistons fitted; large crankshafts refinished by regrinding; broken units welded.

Motor-Truck Parts. Precision Grinding Operations Finish White Motor Trucks, F. B. Jacobs. Abrasive Industry, vol. 5, nos. 2, 3, and 4, Feb. Mar., and Apr. 1924, pp. 29-33, 60-64, and 98-101, 29 figs. Description of grinding methods followed at plant of White Motor Co., Cleveland, Ohio.

Regrinding Practice. Regrinding Methods Outlined, B. K. Price. Abrasive Industry, vol. 5, no. 9, Sept. 1924, pp. 226-230, 7 figs. Practice at plant of Houpert Machine Co., Long Island City, N. Y., in regrinding cylinders.

Rolls. See ROLLS, Grinding.

Textile Castings. Grinding Braiding Machine Parts Rapidly and Accurately, H. R. Simonds. Abrasive Industry, vol. 5, no. 9, Sept. 1924, pp. 221-224, 7 figs. Account of abrasive operations pursued in finishing textile castings.

Wheel Forming Fixtures. Simplifying Form Grinding in Machine Shops, A. R. Noble. Can. Machy., vol. 31, no. 1, Jan. 3, 1924, pp. 33 and 46, 4 figs. Description of wheel forming fixtures which have been successfully employed for various classes of work.

Wood Pulp. A Permanent Grinder for the Production of Wood Pulp for the Manufacture of Paper. Eng. Progress, vol. 5, no. 8, Aug. 1924, pp. 157-159, 6 figs. Describes method and practical design of grinder and results achieved in practice; grinding stone may be driven either electrically, hydraulically, or by some other power.

GRINDING MACHINES

Centerless. The Centerless Method of Grinding, Geo. W. Binns. Ry. Mech. Engr., vol. 98, no. 12, Dec. 1924, pp. 758-759, 3 figs. Method of producing cylindrical surfaces with no control of center of rotation.

Cylindrical. Logarithmic Diagram for Determining Machining Time for Cylindrical Grinding Machines (Logarithmisches Diagramm zur Maschinenzeitbestimmung von Rundschleifmaschinen), G. Ganz. Werkstattstechnik, vol. 18, no. 17, Sept. 1, 1924, pp. 461-463, 5 figs. Calculation of time for piece work by means of a diagram; reversing of machines and its effect on time of grinding; etc.

New Cylindrical Grinding Machine Will Load, Grind and Eject Parts Automatically. Automotive Industries, vol. 51, no. 23, Dec. 4, 1924, pp. 973-974, 2 figs. New Arter machine parts are loaded into turret mechanically or by hand, moved to grinding position by indexing, ground by straight infeed of wheel and then ejected.

Disk. The Use of Fixtures in Disk-Grinding, H. Campbell. Am. Mach., vol. 60, no. 21, May 22, 1924, pp. 759-761, 9 figs. Grinding production determined largely by types of fixture used; recently developed work holders; grinding piston rings automatically; better work and higher production with less labor.

Electrically Driven. Electrically-driven Grinding Machines. Machy. (Lond.), vol. 24, no. 610, June 5, 1924, pp. 312-315, 8 figs. New range of self-contained grinding units by B. R. Rowland & Co., Reddish, England.

Gear. A Full-Automatic Gear Grinder with Adjustable Involute Control. West. Machy. World, vol. 15, no. 1, Jan. 1924, pp. 31-33, 6 figs. Describes machine used in manufacture of ground involute gears, built by Fellows Gear Shaper Co., Springfield, Vt.

A New Full-Automatic Gear Grinder. Eng. Production, vol. 7, no. 137, Feb. 1924, pp. 41-43, 6 figs. Details of involute gear grinder placed on market by Fellows Gear Shaper Co., Springfield, Vt.

High-Traverse. New Landis Grinder Has Stationary Head. Automotive Industries, vol. 50, no. 19, May 8, 1924, p. 1017, 2 figs. Designed to meet demand for oversize precision grinding with long-lived speed production; number of pieces ground per dressing of wheel said to offset higher initial cost.

Internal. European Abrasive Equipment, B. Schapira. Abrasive Industry, vol. 5, no. 1, Jan. 1924, pp. 24-25, 5 figs. Describes horizontal and vertical spindle internal grinders.

Internal Grinding Attachment. Machy. (Lond.), vol. 24, no. 610, June 5, 1924, p. 297, 2 figs. Attachment developed by Kershaw Internal Grinder Co., Manchester, more particularly for garage use in regrinding of worn automobile cylinder bores.

Internal and External Grinding Machines. Machy. (Lond.), vol. 24, no. 617, July 24, 1924, pp. 521-526, 8 figs. Designed by Holroyd & Co., Ltd., Milnrow, for grinding large steel tubes.

Productive Internal Grinding. Brit. Machine Tool Eng., vol. 3, no. 26, Mar.-Apr. 1924, pp. 30-32, 5 figs. Describes internal-grinding machine made by Churchill Machine Tool Co., adapted to suit special piece of work; main features and operation.

Plunge-Cut. Plunge-Cut Grinder. Iron Age, vol. 114, no. 19, Nov. 6, 1924, p. 1199, 2 figs. See also Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 229-230, 3 figs. Wide-wheel, in-feed machine with reciprocating spindle adapted to production work; placed on market by Cincinnati Grinder Co.

Rail-Joint. See RAILS, Joint-Grinding Machine.

Railway Shops. English Development of Railroad Grinding Equipment, W. F. Sandmann. Am. Mach., vol. 61, no. 16, Oct. 16, 1924, pp. 601-602, 7 figs. Discusses use of grinding machines in railway shops; types of machines for grinding locomotive parts.

Rock-Drill. Rock Drill Maintenance. British Machine Tool Eng., vol. 3, no. 28, July-Aug. 1924, pp. 91-94, 8 figs. Economy to be obtained by use of precision grinding machines. Describes Churchill No. 1 and Universal grinding machines.

Spindles. Internal Grinding Machine Spindles. Machy. (Lond.), vol. 25, no. 639, Dec. 25, 1924, pp. 404-407, 11 figs. Describes types of spindles and methods of using them.

Surface. Feed Arrangement in Diskus Surface Grinding Machines (Die Werkstückbewegung bei Diskus-Flächenschleifmaschinen), C. Krug. Werkstattstechnik, vol. 18, no. 17, Sept. 1, 1924, pp. 452-455, 7 figs. Discusses uniform and irregular movement of work table; arrangement of inclined planes with oil feed; hydraulic drive with automatic control.

Swing-Frame, Portable and Hand. Swing-Frame, Portable and Hand Grinding Machines. Am. Mach., vol. 61, no. 17, Oct. 23, 1924, pp. 645-648, 6 figs. Early swing frames; greater freedom of movement needed; electric motor and solid wheel aid in development.

GRINDING MILLS

Ball and Pebble Mills. Design and Operation of Ball and Pebble Mills, E. W. Lawler. Chem.

& Met. Eng., vol. 30, no. 13, Mar. 31, 1924, pp. 517-518. Practical notes on factors affecting operation on non-continuous ball or pebble mills.

Cost of Equipment for. Crushing and Grinding Costs, T. Fuwa. Chem. & Met. Eng., vol. 31, no. 7, Aug. 18, 1924, pp. 268-271, 6 figs. Analysis of cost of various types of equipment for disintegrating materials and their installation and operation.

Rotary Mills. Rubber Lining for Rotary Grinding Mills, R. B. Donnelly. Rock Products, vol. 27, no. 20, Oct. 4, 1924, pp. 60-62, 6 figs. Experiments which show lessened wear and increased grinding efficiency.

GRINDING WHEELS. See ABRASIVE WHEELS.

GROUND WATERS. See GEOLOGY, Groundwaters.

GUN METAL

Admiralty. Some Experiments on the Influence of Casting Temperature and Mass on the Physical Properties of Admiralty Gun-Metal, F. W. Rowe. Inst. of Metals—Advance Paper no. 12, for meeting Sept. 8-11, 1924, 5 pp., 6 figs. Describes experiments selected from a large number as being typical results obtained in everyday works practice, and made under ordinary works conditions, without any special precautions to insure exceptional purity of metal or abnormal test results.

GUNITE

Mine-Timber Coating. See MINE TIMBERING, Preservation.

Protection for Steel Structures. Gunite Protection for Steel Structures, P. Gillespie and P. J. Culliton. Can. Engr., vol. 47, nos. 18 and 19, Oct. 28 and Nov. 4, 1924, pp. 451-454 and 473-476, 7 figs. Experiments at Leaside, Ont., with two 42-ft. steel plate girders covered with gunite to ascertain cause of superficial cracks on bridges at Hamilton. Conclusions favor employment of guniting process.

GUNNERY

Naval, Motion Study in. See MOTION STUDY, Naval Gunnery.

GUNS

Erosion of. Improvements in Gun-Construction and Allied Problems, T. Tanimura. Tokyo Imperial Univ., Faculty of Eng.—Jl., vol. 13, no. 4, Mar. 1923, pp. 103-175, 10 figs. Concludes that as gun erosion cannot be remedied at present, gun construction rendering relining easy should be studied; inner surface of bore of relined guns is always subjected to stress beyond elastic limit; proposes improved construction on these lines.

GUTTA PERCHA

Preparation and Properties. Gutta-Percha: Its Preparation and General Properties, C. W. H. Howson. India-Rubber Jl., vol. 68, nos. 20 and 21, Nov. 15 and 22, 1924, pp. 9-14 and 15-17. See also Rubber Age, vol. 5, no. 10, Dec. 1924. pp. 512-520, and (discussion) 520-523. Geographical distribution, methods of collection, methods of extraction from leaves, cleaning and hardening processes; balata, and method of collecting it; coagulation of balata latex; chemical analysis of crude gutta-percha and balata; chemical composition; physical and chemical properties; effect of temperature, etc.

GYPSUM

Analysis. Analysis of Gypsum and Gypsum Products, F. C. Welch. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 238-241, 3 figs. Samples of raw gypsum were analyzed for gypsum and anhydrite according to present recommended method of analyses and checked by microscopic analysis; method was found to be unsatisfactory, and method is here recommended which enables chemist to determine percentages of constituents present in their mixtures.

Comparison of Methods of Analysis of Gypsum, P. P. Budnikoff. Am. Ceramic Soc.—Jl., vol. 7, no. 11, Nov. 1924, pp. 817-820. Results of experimental test of different analytical methods proposed for evaluation of gypsum.

Canada. Gypsum Situation in Canada. Can. Min. Jl., vol. 45, no. 37, Sept. 12, 1924, pp. 908-909. Résumé of conditions.

Manufacture. Gypsum from the Industrial Point of View (Le gypse au point de vue industriel), J. Dautrebande. Revue Industrielle, vol. 54, no. 2185, Dec. 1924, pp. 401-408, 8 figs. Chemical analysis, and composition; method of manufacture, and kilns, crushers, etc., used; layout of modern manufacturing plant of Société Dalbouze Brachet & Co.

Mining and Refining. Modern Methods and Processes of Mining and Refining Gypsum, A. W. Tyler. Rock Products, vol. 27, nos. 12, 14, 18, and 20, June 14, July 12, Sept. 6, and Oct. 4, 1924, pp. 27-32, 48-51, 43-46, and 44-47, 46 figs. June 14: Review of size and growth of gypsum products industry of United States. Winning of raw gypsum rock from earth by mining and quarrying. July 12: Crushing, rock storage, drying. Sept. 6: Screening, air separating, grinding, calcining. Oct. 4: Calcining.

Working Big Gypsum Deposit in Montana. Pit and Quarry, vol. 8, no. 8, May 1924, pp. 92-94, 6 figs. Mining operations of Northwest Gypsum Products Co. at its deposits near Lewiston.

Persia. The Gypsum Deposits of Southwestern Persia, J. V. Harrison. Economic Geology, vol. 19, no. 3, Apr.-May 1924, pp. 259-274, 2 figs. Field observations on occurrence of gypsum in southwestern Persia, with special reference to light they throw upon origin of deposits of this mineral. Bibliography.

Production, 1924. Gypsum in 1923, K. W. Cottrell. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:7, Sept. 27, 1924, pp. 63-68. Production; imports and exports; manufacturers of gypsum plaster.

Properties and Manufacture. Gypsum—An Important Building Material, V. G. Marani. Contract Rec., vol. 38, no. 51, Dec. 17, 1924, pp. 1235-1237. Nature, properties, manufacture and use of gypsum and its commercial products. Economics of the material.

Temperature and Pressure Effects. Effects of Temperature and Pressure on Gypsum and Anhydrite, Marie Farnsworth. U. S. Bur. Mines—Report of Investigations, no. 2654, Nov. 1924, 3 pp. Facts established by tests bearing on stability relations of gypsum and anhydrite.

GYROSCOPES

Schlick. A Contribution to the Theory of the Schlick Gyroscope (Ein Beitrag zur Theorie des Schlickschen Schiffskreisels), M. Schuler. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 47, Nov. 22, 1924, pp. 1224-1226, 5 figs. It is shown that a Schlick gyroscope is adversely affected by turning of the ship, when changing course or in yawing; the force of yawing is converted by gyroscope into rolling movements, and thus the gyroscope causes rolling instead of having a steadying effect; shows how this defect can be remedied by an alteration in the Schlick gyroscope arrangement.

Ship Stabilizers. See SHIPS, Stabilizers.

Ship Stabilizing. Use of Gyroscopes in Stabilizing Ships (L'emploi du gyroscope pour la stabilisation des navires), G. Malgorn. Vie Tech-

nique et Industrielle, vol. 5, no. 59, Aug. 1924, pp. 304-306, 4 figs. Discusses theory of gyroscope and its application to near ships, giving examples.

Theory. Some Properties of Spherical Curves, with Applications to the Gyroscope, O. D. Kellogg. Am. Mathematical Soc.—Trans., vol. 25, no. 4, Oct. 1923, pp. 501-524, 2 figs. Discusses certain intrinsic properties of spherical curves and applies results to theory of gyroscope; gives further results and formulas in connection with gyroscope problems.

H

HALL EFFECT. See METALS, Hall Effect.

HAMMERS

Drop. A Remarkable Drop Hammer and Its Work. Engineer, vol. 138, no. 3577, July 18, 1924, pp. 86-87, 4 figs. partly on p. 76. Describes drop hammer designed and made by Brett's Patent Lifter Co., Ltd., Coventry, Eng., for Powell-Brett, Ltd., of Midland Works, Coventry, by whom it is being used, among other things, for direct stamping of railway car wheels. Falling weight, 20 tons.

New Type of Drop Hammer for Multiple-Die Stamping. Engineer, vol. 137, no. 3554, Feb. 8, 1924, pp. 154-155, 4 figs. Brett drop hammer fitted specially for multiple-die stamping work.

Pneumatic. Critical Observations on Pneumatic Hammers (Kritische Betrachtungen über Lufthämmer). W. Baron. Werkstatttstechnik, vol. 18, no. 20, Oct. 14, 1924, pp. 565-567, 10 figs. Discusses design and construction, and arrangement of pneumatic operating device.

Economic Study of Forging Practice with Special Regard to Pneumatic Hammers (Wirtschaftlichkeitsstudie des Schmiedebetriebes unter besonderer Berücksichtigung der Schmiedelufthämmer), M. Cyron. Glasers Annalen, vol. 94, nos. 1, 6, 12, and vol. 95, no. 4, Jan. 1, Mar. 15, June 15, and Aug. 15, 1924, pp. 3-11, 65-72, 154-162, and 56-64, 49 figs. Deals with phenomena in connection with iron and steel forging; behavior of steam and pneumatic hammers from economic viewpoint; practical investigations on most important types of pneumatic hammers; two-cylinder hammers, drop hammer for testing, and results of tests of various types of hammers.

New Pneumatic Hammer for Individual Blows (Neuer Lufthammer mit Einzelschlag), E. Preger. Werkstatttstechnik, vol. 18, no. 20, Oct. 14, 1924, pp. 569-575, 18 figs. Discusses conditions for effective individual blows and describes a hammer constructed accordingly; 20 per cent greater performance than heaviest repetition blow.

Pneumatic Hammers (Lufthämmer), A. Halse. Werkstatttstechnik, vol. 18, no. 9, May 1, 1924, pp. 251-255, 16 figs. Conditions governing choice of steam or pneumatic hammers; description with test results of Hartmann double-blow pneumatic hammers.

Spring. A New Power Hammer (Ein neuer Krafthammer), L. Kort. Hanomag-Nachrichten, vol. 11, no. 129-130, July-Aug. 1924, pp. 134-138, 7 figs. Design and operation of Kort power hammer, combining advantages of pneumatic hammers and those of present spring hammers.

Steam vs. Air. Steam vs. Air in Forging-Hammer Practice (Dampf oder Luft für den Hammerbertieb), F. Beleke. Maschinenbau, vol. 3, no. 12, Mar. 27, 1924, pp. 389-394, 18 figs. Comparison of economy of steam, pneumatic, and air hammers; points out applications for which each type is most adaptable.

HANGARS

France. The Dirigible Hangar at the Airport of Orly (Les hangars à dirigeables de l'aéroport d'Orly), M. Freyssinet. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 298-313, 17 figs., partly on supp. plate. Discusses theory and design of a hangar to give adequate stability and resistance; choice and tests of materials of construction, as applied in reinforced-concrete hangar at Orly.

Omaha, Neb., Collapse. Omaha Aerial Mail Hangar Wrecked by Gale, R. M. Brown. Eng. News-Rec., vol. 93, no. 5, July 31, 1924, pp. 180-182, 3 figs. Violent gale crushed in end wall and twisted out of position roof trusses of a large steel-framed airplane hangar. Circumstances of wreck and design of structure.

Reinforced-Concrete. Housing a Dirigible in a Reinforced Concrete Hangar. Am. Architect, vol. 126, no. 2458, Nov. 5, 1924, pp. 451-454, 8 figs. Design of two hangars built at Orly, near Juvisy, France; length, 1000 ft.; width, 300 ft.; height, 196 ft.; ends are closed by metal doors swinging outward.

Turkey. Hangar Erection in Iraq, R. Hamilton. Roy. Engrs. Jl., vol. 38, no. 1, Mar. 1924, pp. 13-24, 17 figs. partly on supp. plate. Description of the various types of steel hangar built for Hinaidi aerodrome near Bagdad (Turkey in Asia), methods used, and details regarding time, labor, and personnel.

HARBOR IMPROVEMENTS

New York. The Improvement of New York Harbor, H. N. Babcock. Military Engr., vol. 16, no. 85, Jan.-Feb. 1924, pp. 55-58, 5 figs. Improvement of harbor entrance from 1885 to 1914, including deepening of Gedney's Channel and excavation of Ambrose Channel, and description of dredges.

Paris, France. Harbor Works of the Port of Paris (Les travaux du port de Paris). Bul. Technique du Bur. Veritas, vol. 6, no. 2, Feb. 1924, pp. 21-23, 3 figs. Port of Paris is understood to comprise the various quays, basins, loading and unloading plants on banks of Seine River between Choisy-le-Roi and Gennevilliers, on banks of Marne from Nogent, and on canals Saint-Martin, Saint-Denis, and Ourcq; protection against floods; development of commercial port.

HARBORS

Pollution from Oil, Safety against. The Pollution of Harbors and Canals from Oil (Einiges über Oelbesudelung von Häfen und Kanälen), B. Müller. Schiffbau, vol. 25, no. 13, Apr. 9, 1924, pp. 337-339, 1 fig. Cause of pollution is said to be improper design of storage and tapping arrangements of liquid fuel required for motorships; describes Martini & Hüneke system for prevention of discharge and explosion; through admission of non-oxidizing gases, such as carbonic acid, nitrogen, etc., in tanks, fittings, and pipe lines, there is no possibility of discharge from tanks and pipe lines, nor of ignition or explosion from within.

See also WATER POLLUTION.

HARDNESS

Aluminum Bronze, Heat-Treated. See ALUMINUM BRONZE, Heat-Treated, Hardness of.

Brinell Ball Testing Method. Ball Method of Hardness Testing and Its Importance Today in

the Evaluation of Metallic Materials (La prova di druezza alla sfera e la sua importanza nell'odierno collaudo dei materiali metallici), V. Prever. Ingegneria, vol. 3, no. 1, Jan. 1, 1924, pp. 16-21, 10 figs. partly on supp. plate. Deals with load employed in penetration test and its influence on Brinell number; duration of application of load; influence of diameter of ball employed; ball deformation; and relation between hardness and tensile strength. Results obtained on carbon and alloy steels at research laboratory of Fiat Company in Turin.

Effect of Duration of Load on Ball Pressure Hardness (Ueber den Einfluss der Belastungsdauer auf die Kugeldruckhärte), R. Mailänder. Kruppsche Monatshefte, vol. 5, Oct. 1924, pp. 209-213, 14 figs. Discusses variation in ball test depending on time ball is under load, and describes a new method in which same ball impression is measured at intervals without releasing pressure and using a Martens mirror, and results obtained.

Improvements in the Brinell Test on Hardened Steel, Including a New Method of Producing Hard Steel Balls, A. Hultgren. Iron & Steel Inst.—Advance paper no. 7, for meeting Sept. 1924, 30 pp., 12 figs. partly on supp. plate. Describes a method of producing steel balls considerably harder than those heretofore available, and therefore especially suitable for Brinell tests on hardened steel. Results of Brinell tests on hardened, as well as hardened and tempered steel specimens, to determine magnitude of error in hardness number due to permanent flattening of ball. Results of study by different tests of surface hardness and strength of cold-worked balls, as compared with those of other balls of different make and treatment. Use of etched balls suggested as means of increasing accuracy of measuring Brinell impression on hardened steel. Gives conversion table for Brinell numbers and describes a magnetic ball holder.

On the Indentation Hardness of Metals, K. Honda and K. Takahasi. Iron & Steel Inst.—Advance paper no. 10, for meeting May 1924, 11 pp., 6 figs. Points out that Brinell hardness, when impression is measured during application of load, is quite correct, and much less than that by usual method of measurement; new definition of hardness is given.

The Accurate Determination of the Hardness of Metals. Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 518-519, 5 figs. Investigation of Brinell test with object in view of designing method of testing which yields Brinell hardness numerals of thoroughly reliable order, free from irregularities to which Brinell test is exposed when carried out in ordinary way.

The Ball Indentation Hardness Test, S. L. Hoyt. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 396-420, 4 figs. Refers to Meyer's investigation of Brinell's ball indentation hardness test first published in 1908, in which he showed that hardness of metal canont truly be represented by one figure, or, in other words, resistance to penetration varies with degree of penetration of ball; author of present paper discusses Meyer's analysis to throw light on our present methods of hardness testing.

The Value of the Brinell Hardness Test to the Gray-Iron Foundry, I. Jaederstroem. Testing, vol. 1, no. 4, Apr. 1924, pp. 286-289, 2 figs. Results of researches. Main reason for great popularity of Brinell test in investigation of steel is fact that it does not only indicate resistance of material to penetration of another, harder body, but that hardness values thus obtained permit also definite conclusions on tensile strength of steel under investigation.

Brinell Hardness and Tensile Strength. See METALS, Brinell-Tensile Relationship.

Cold Working and. See METALS, Cold Working.

Herbert Pendulum Tester. Comparison of Herbert Pendulum Hardness Tester with Other Hardness Testers, J. O. Keller. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 818-824, 21 figs. Results of tests; data on specimens tested; Herbert pendulum, its action and theory; interpretation of photomicrographs taken on sections.

Investigations on the Herbert Pendulum Hardness Tester, C. Benedicks and V. Christiansen. Iron & Steel Inst.—Advance paper no. 2, for meeting Sept. 1924, 20 pp. 7 figs. Construction and working of this new instrument, which permits use of even very small specimens, and comparison of results with those of Brinell method.

Measuring the Hammer Hardness of Metals by Means of a Herbert Pendulum (Mesure de l'écrouissage des métaux au moyen du pendule Herbert). Bulletin Technique de la Suisse Romande, vol. 50, no. 17, Aug. 16, 1924, pp. 217 and 219, 5 figs. Details of apparatus by means of which hardness is determined as function of permanent and elastic deformation produced by ball.

See also Work Hardening.

Magnetic Tests. A Correlation between the Mechanical Hardness and the Magnetorestrictive Effects of Ferromagnetic Substances, S. R. Williams. Am. Soc. Steel Treating—Trans., vol. 5, no. 4, Apr. 1924, pp. 362-368, 3 figs. Method of determining physical properties of metals through magnetic means; relative merits of X-ray and magnetic means of determining flaws in metals; Joule effect; discusses experiments wherein endeavor was made to relate magnetostriction and hardness of ferromagnetic substances.

Metal-Products Hardness Testing. The Logical Course of Development of Additional Apparatus for Investigating the Hardness of Metal Products in Works' Practice, H. A. Holz. Testing, vol. 1, nos. 3 and 4, Mar. and Apr. 1924, pp. 247-262, and 308-325, 29 figs. States that logical course of development of additional apparatus for investigating hardness of metals and metal products lies entirely in direction of appliances for application of Brinell test to problems for which this method has not been or could not be applied heretofore. Discusses some of the results established by U. S. Bur. Standards in its investigation of Brinell meter developed by F. H. Schoenfuss.

Numbers. See METALS, Hardness Numbers.

Steel Balls, Magnetic Test. Hardness of Steel Balls by Magnetic Tests, S. R. Williams. Am. Soc. Steel Treating—Trans., vol. 5, no. 5, May 1924, pp. 479-484, 4 figs. Rapid method of determining magnetically hardness of steel balls; with this method it is possible to conduct 100 per cent inspection on balls for hardness, with considerable rapidity; illustrations showing schematic arrangement of author's apparatus, and set-up and graphs of certain tests made upon balls having different degrees of hardness.

Testing. Duration of Load in the Hardness Testing of Soft Metals (Bearing Metals [Die Belastungsdauer bei der Härteprüfung weicher Metalle (Lagermetalle)], P. Lieber. Zeit. für Metallkunde, vol. 16, no. 4, Apr. 1924, pp. 128-131, 5 figs. Hardness determination with different time durations of load; measurement of depth of indentation because of hardness differences inside of different sample pieces; experimental results and conclusions for practical application of ball test.

The Hardness of Metals and Hardness Testing. Mech. Eng., vol. 46, no. 6, June 1924, pp. 360-362. Observations on nature of hardness, together with descriptions of various methods used in testing. Report prepared at request of Special Research Committee on Cutting & Forming of Metals.

See also MICROSCOPES, Reichert-Brinell.

Testing Machines. Hardness Testing, with Special Regard to Dynamic Hardness Testing Machines (Ueber Härteprüfung, mit besonderer Berücksichtigung des Fallhärteprüfers), M. v. Schwarz. Maschinenbau, vol. 3, no. 10, Feb. 28, 1924, pp. 316-319, 5 figs. Describes new type of hardness testing machine developed by author; results of tests showing its useful applications.

Variation with Temperature. Variation of the Hardness of Metals with Temperature (Die Abhängigkeit der Härte von der Temperatur), F. Sauerwald. Zeit. für Metallkunde, vol. 16, no. 8, Aug. 1924, pp. 315-316, 1 fig. Measurements of hardness of tin, aluminum, copper, and antimoney between 10 deg. and their melting points by dynamic method of Wüst and Bardenheuer showed that in all cases hardnes decreases linearly with rise of temperature and that, even just below melting point, each metal possesses considerable hardness.

Work Hardening. Work-Hardening of Metals and the Herbert Tester. Engineer, vol. 137, no. 3558, Mar. 7, 1924, pp. 248-251, 5 figs. Discusses use of pendulum tester (described in Apr. 13, 1923, issue of same journal) for investigation of scale hardness figures; gives list of work-hardening figures of various materials, as determined by E. G. Herbert, inventor of instrument. See also editorial on pp. 257-258.

Work-Hardening of Various Metals, E. G. Herbert. Iron Age, vol. 113, no. 25, June 19, 1924, pp. 1792-1793, 3 figs. Measuring extent of progressive change with Herbert pendulum hardness tester.

HARMONICS

Analyzer for. A New Harmonic Analyzer, K. Noguchi. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 433, Aug. 1924, pp. 793-799, 4 figs. Describes new type of harmonic analyzer devised by author and gives actual result of analyzing isosceles-triangular wave. (In Japanese.) See also Engineering, vol. 118, no. 3078, Dec. 26. 1924, pp. 876-877, 5 figs.

Electric Transmission Lines. Harmonics in Power Transmission Lines (Les harmoniques dans les réseaux de distribution d'énergie), P. Bunet. Industrie Eléctrique, vol. 33, no. 771, Aug. 10, 1924, pp. 501-506, 6 figs. Discusses successive harmonics of polyphase currents, especially two and three-phase, and establishes formulas for their calculation.

Inharmonic Analysis, Wave Analyzer Applied to. Photomechanical Wave Analyser Applied to Inharmonic Analysis, C. F. Sacia. Optical Soc. Am.—Jl., vol. 9, no. 4, Oct. 1924, pp. 487-494, 6 figs. Following brief review of principles of Fourier analysis, author describes apparatus and method used for obtaining analyses of large number of oscillograms of spoken vowel sounds.

Slot Openings. Harmonics Due to Slot Openings, C. A. M. Weber and F. W. Lee. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1129-1132, 13 figs. Graphical-analytical exposition of harmonics due to slot openings; applies particularly to field form of rotating field motor such as induction motor.

Transformers. Further Notes on Transformer Third Harmonics with the Star/Star Connection, S. A. Stigant. Elec. Times, vol. 66, no. 1729, Dec. 4, 1924, pp. 657-660, 5 figs.

Predetermination of Overvoltages by the Harmonics Oil-Immersed Transformer Saturation (Predetermination des surtensions par les harmoniques de saturation des transformateurs), P. Bouchert and J. Fallou). Revue Générale de l'Electricité, vol. 15, no. 22, May 31, 1924, pp. 979-988, 9 figs. Method of predetermining harmonics of saturation; points out that magnetic saturation, although it produces overvoltages, has the effect of limiting them; investigation of how these contrary influences adjust themselves when magnetic saturation is progressively increased.

HEALTH

Accidents and. See ACCIDENTS, Industrial.

Eye Injuries. See ACCIDENTS, Eye Injuries.

Eyesight Conservation. Protecting Eyesight of Workers. Iron Trade Rev., vol. 75, no. 9, Aug. 28, 1924, pp. 540-542. First essential is use of goggles. Education important. Cost of eye hazards.

Industrial Health-Service Plan. How Do Employees Use the Hospital Facilities? M. R. Lott. Indus. Management (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 58-62, 5 figs. Summation of health-service work at Sperry Gyroscope Co.

Miners'. See MINERS, Conditions Affecting Health; Diseases; Effect of High Temperature on; Nystagmus.

Nickel Itch. The Treatment of Nickel Itch. Brass Wld., vol. 20, no. 7, July 1924, pp. 240-241. Report of A. E. S. committee giving causes and treatment of this type of eczema.

Physiological Reactions to Air Cooling. Cooling Effect on Human Beings Produced by Various Air Velocities, F. C. Houghten and C. P. Yagloglou. Am. Soc. Heat & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 169-184, 13 figs. Study of relation of temperature, humidity, and air motion to human comfort, giving details of tests and results obtained.

Physiological Reactions to High Temperatures. Air-Motion—High Temperatures and Various Humidities—Reaction on Human Beings, W. J. McConnell and C. P. Yagloglou. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 3, Mar. 1924, pp. 199-224, 19 figs. Results of experiments on physiological reactions to high temperatures and humidities, presented with the view of illustrating influence moving air exerts over still air.

Sanitation, Relation to. See SANITATION.

HEAT

Convection in Liquids. See LIQUIDS, Convection of Heat in.

Dissipation from Cylindrical Surfaces. Heat Dissipation from the Surfaces of Pipes and Cylinders in an Air Current, A. H. Gibson, Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 324-336, 4 figs. Experiments carried out with view of obtaining data as to rate of heat dissipation from tubular metal surfaces adaptable as oil coolers for aircraft.

Equivalent Values Produced by Fuels. Determination of Equivalent Value of Heat Produced by Electricity and by Coal (Ueber die Bestimmung des Aequivalentes der elektrisch erzeugten Wärme im Vergleich zu der durch Kohle erzeugten Wärme), F. Rutgers. Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 8, Aug. 1924, pp. 393-409, 8 figs. Discusses difficulties of determination and shows by a large number of examples how equivalents may be obtained and that they vary between wide limits.

Flow, Meter for. See HEAT TRANSMISSION, Heat Flow Meter.

German Code for Temperature Scale. See TEMPERATURE MEASUREMENT, Temperature Scale and Heat Unit.

Insulation. See INSULATION, HEAT.

Pumps. See HEAT PUMPS.

Radiation. Heat Radiation from the Point of View of Industrial Application (Le rayonnement calorifique envisagé du point de vue des applications industrielles), C. Roszak and M. Vernon

Revue de Métallurgie, vol. 21, nos. 8, 9, and 10, Aug., Sept., and Oct. 1924, pp. 435-449, 549-564, and 600-609, 24 figs. Discusses fundamental laws, including those of Kirchhoff, Lambert, and Stefan; practical formulas for calculating radiation, and their application in calculating radiation in boiler furnaces; practical importance of knowledge of laws of radiation.

Radiation of Flue Gases and Its Practical Calculation (Ueber die Bestimmung der wahren Temperature undurchsichtiger diffus reflektierender Körper), M. Pirani. Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 266-267. Shows that radiation increases with temperature approximately according to Plank's law of radiation and gives method for its calculation.

Recent Progress in the Study of Heat Radiation (Neuere Erkenntnisse auf dem Debiete der Wärmestrahlung), A. Schack. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 39, Sept. 27, 1924, pp. 1017-1020, 4 figs. Planck's, Kirchoff's, and the Stefan-Boltzmann laws of radiation; heat transmission in furnaces and boilers; radiation of gases; points out necessity of further investigation of radiation of solid surfaces at different temperatures.

Storage. See HEAT STORAGE.

Theory. Walter Nernst's Sixtieth Birthday (Zum 60. Geburtstag von Walther Nernst), M. Schmolke. Wärme, vol. 47, no. 25, June 20, 1924, pp. 287-290. Discusses progress due to Nernst in theory of heat, third heat law and its application, Nernst lamp, etc.

Transmission. See HEAT TRANSMISSION.

Waste, Use of. See WASTE HEAT.

HEAT CONDUCTIVITY.

Metals. See METALS, Heat Conductivity.

HEAT EXCHANGERS. See GASOLINE, Heat Exchangers; HEAT TRANSMISSION, Heat Exchangers.

HEAT PUMPS

Applications. Utilization of the Heat of Low Temperature (Ueber die Nutzbarmachung von Wärme niedriger Temperatur), Ferdinand. Gesundheits-Ingenieur, vol. 47, no. 11, Mar. 15, 1924, pp. 81-82, 9 figs. Describes applications of heat pumps which work on principle of refrigerating machines.

Principle and Applications. The Heat Pump (Die Wärme-Pumpe), K. Schreber. Gesundheits-Ingenieur, vol. 47, nos. 14 and 15, Apr. 5 and 12, 1924, pp. 105-108 and 119-121, 8 figs. Heat pumps are described as plants with which, under use of mechanical work, heat quantities are heated from colder to warmer temperature; deals especially with concentrating plants, in which steam from solution is compressed and then used for heating solution which is to be concentrated; and heating plants in which working value of gases coming from grate is recovered as far as possible and used as work energy and for heating of rooms.

HEAT STORAGE

Accumulators, Calculation of. The Calculation of Solid Heat Accumulators (Die Berechnung fester Wärmespeicher), K. Grütter. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 10, Oct. 1924, pp. 493-510, 8 figs. Calculation of temperatures inside of a plate-shaped homogeneous accumulator of solid material under assumption that heat volume admitted to internal wall and the external temperature are periodically variable; calculation of heat radiated by external surface and of temperature of internal wall; values are used for design calculation of plate-shaped heat accumulators of homogeneous solid material.

Applications in Industry. The Application of Heat Storage in Industry (Verwendbarkeit der Dampfspeicherung in der Industrie), Trautmann. Gesundheits-Ingenieur, vol. 47, no. 16, Apr. 19, 1924, pp. 137-139. Discusses different systems of heat storage, their useful possibilities, and advantages.

Electric. Electric Storage Heating (Elektrische Speicherheizung). Gesundheits-Ingenieur, vol. 47, no. 38, Sept. 16, 1924, pp. 433-434, 1 fig. To make use of current from power house during off-hours for heating, it was used to heat water in a storage boiler between 10 p. m. and 6 a. m., which in turn was used between 6 a. m. and 10 p.m. for heating.

Hot-Water Accumulators. Heat Storage Plants in Connection with Boilers (Die Wärmespeicher in Verbindung mit Dampfkesseln), H. E. Witz. Wärme, vol. 47, no. 9, Feb. 29, 1924, pp. 83-87, 16 figs. Influence of pressure fluctuations and their elimination by use of hot-water accumulators; importance of such accumulators for maximum-pressure boilers.

HEAT TRANSMISSION

Boilers. Heat Transmission in Boilers, Chas. F. Wade. Power Engr., vol. 19, no. 219, June 1924, pp. 224-226, 4 figs. Discussion of principles and suggestions for improvements; deals with "luminous" flames, conduction, gas films, and temperatures.

The Transmission of Heat in Boilers, W. N. Booth. Gas Wld., vol. 80, no. 2071, Mar. 29, 1924, pp. 288-290, 6 figs. See also Gas Jl., vol. 166, no. 3177, Apr. 2, 1924, pp. 36-38, 6 figs. Conditions which affect flow of gas adjacent to a solid surface; conduction and convection; transmission of heat through boiler plates.

Building Materials. Experimental Study of the Transmission of Heat Through Certain Construction Materials (Etude expérimentale de la transmission de la chaleur par quelques matériaux de construction), A. Dumas. Bul. Technique de la Suisse Romande, vol. 49, nos. 23 and 24, Nov. 10 and 24, 1923, pp. 277-280 and 289-295, 11 figs. Results of extended series of tests carried out at Univ. of Lausanne on various wall constructions used in building work and under identical conditions.

Buildings. An Improved Method of Determining the Heat Transfer Through Wall, Floor, and Roof Sections, R. F. Norris, H. H. Germond and C. M. Tuttle. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 109-114, 1 fig. Describes method developed in Burgess laboratories and apparatus used.

Measuring Heat Transmission in Building Structures and a Heat Transmission Meter, P. Nicholls. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 1, Jan. 1924, pp. 35-70, 30 figs. Deals with measurement of heat flow through walls, more particularly of existing structures. Outlines principles employed and describes work done at A. S. H.-V. E. research laboratory in attempt to develop a heat transmission meter which will indicate instantaneous flows. Difficulties involved in such measurements and variable factors in building materials that will influence heat-transmission constants. Review of present state of knowledge, future requirements, and indications of probable trend of investigational work.

Condensers, Surface. See CONDENSERS, STEAM, Surface.

Convection. Heat Transfer by Convection, T. S. Taylor. Optical Soc. Am.—Jl., vol. 9, no. 6, Dec. 1924, pp. 693-700. In considering total heat loss when forced convection is involved,

loss by radiation plays rather unimportant part; such is not the case for free convection, therefore exact knowledge of methods of accurately determining surface temperatures and radiation constants would be very helpful.

Evaporators. See Problems.

Firebrick. See FIREBRICK, Heat Transmission through.

Furnace Walls. See Problems.

Heat Exchangers. Economic Features of Heat-Exchanger Design, F. L. Maker and M. W. Thornburg. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 891-895, 4 figs. Factors determining economic area of heat exchangers, particularly as applied to oil-refinery operations; graphic methods of analysis which is simpler and more direct than methods generally used.

Heat-Flow Meter. Practical Applications of the Heat Flow Meter, P. Nicholls. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 6, June 1924, pp. 439-451, 8 figs. Results of application of heat flow meter for determining thermal constants of certain building structures.

Internal-Combustion Engines. See INTERNAL-COMBUSTION ENGINES, Heat Transmission from Working Fluid.

Liquids. See LIQUIDS, Heat Transfer.

Metals. See METALS, Heat Transmission in.

Meter for. See Problems.

Pipes. Heat Transfer in Small Pipes, F. C. Blake and W. A. Peters, Jr. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 845-846, 2 figs. Method developed by authors of measuring water temperature by drawing off portion.

Problems. Heat Transfer Symposium. Indus. & Eng. Chem., vol. 16, no. 5, May 1924. Contains following articles: Heat Transmission from Bare and Insulated Pipes, R. H. Heilman, pp. 451-458, 10 figs.; Heat Transmission in an Inclined Rapid Circulation Type Vacuum Evaporator, D. J. Van Marie, pp. 458-459, 2 figs.; Forced Convection of Heat in Gases and Liquids, Chester W. Rice, pp. 460-467, 4 figs.; Optimum Operating Conditions for Pipe Heating and Cooling Equipment, W. K. Lewis, J. T. Ward, and E. Voss, pp. 467-468; Heat Transfer in Enamel-Lined Apparatus, E. P. Poste, pp. 469-470; Characteristics of Air-Blast Heaters, F. R. Ellis and J. D. White, pp. 471-473, 8 figs.; Studies in Evaporator Design—Effect of Surface Conditions, L. A. Pridgeon and W. L. Badger, pp. 474-478, 3 figs.; Evaporator Scale Formation, W. L. McCabe and C. S. Robinson, pp. 478-479; 3 figs.; The Film Concept of Heat Transmission Applied to a Commercial Water Heater, D. K. Dean, pp. 479-483, 3 figs.; Loss of Heat from Furnace Walls, Rob. Calvert and L. Caldwell, pp. 483-490, 11 figs.; A Heat Transmission Meter, P. Nicholls, pp. 490-493, 3 figs. See also Abstracts of Papers in Chem. & Met. Eng., vol. 30, no. 17, Apr. 28, 1924, pp. 661-665.

Refrigerating System. See REFRIGERATING PLANTS, Heat Transmission in.

Research. Research in Heat Transmission, E. Buckingham. Mech. Eng., vol. 46, no. 7, July 1924, pp. 386-388. Also Refrig. Eng., vol. 11, no. 3, Sept. 1924, pp. 91-94. Conduction, radiation, and convection; conduct of research in heat transmission; employment of dimensional analysis; variables involved in complete mathematical theory of heat transmission; suggestions in regard to planning of research programs.

Steam-Engine Cylinders. See STEAM ENGINES, Cylinders, Heat Transmission in.

Steam Pipes. See also Problems.

Thermal Conductivity. Methods of Measuring Thermal Conductivity in Solids and Liquids, L. R. Ingersoll. Optical Soc. Am.—Jl., vol. 9, no. 4, Oct. 1924, pp. 495-501. Linear-flow, radial-flow and periodic-flow methods.

New Tests on the Thermal Conductivity of Liquids, Insulating Materials and Metals (Nouveaux essais sur la conductibilité calorifique des liquides, matières isolantes et métaux), M. Jakob. Chaleur & Industrie, vol. 5, no. 46, Feb. 1924, pp. 62-65, 3 figs. Shows how to utilize to advantage relations between thermal properties of bodies and their employment in industry.

Walls. Heat Loss through Wall Constructions, A. Kolflaath. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, nos. 9 and 10, Sept. and Oct. 1924, pp. 627-643 and 661-668, 10 figs. Describes experiments carried out at Norway Inst. Technology, Trondhjem, Norway. Develops thermal coefficients from 27 test houses built in an open field, which may be used for other constructions than those tested.

Heat Transmission Through Dwelling House Walls. Am. Architect, vol. 126, no. 2455, Sept. 24, 1924, pp. 299-306, 29 figs. Results of tests on various kinds of wall construction, made by Norwegian Government at Trondhjem, Norway.

See also WALLS, Testing.

Water Flowing Inside Pipes. Heat Transfer for Water Flowing Inside Pipes, W. H. McAdams and T. H. Frost. Refrig. Eng., vol. 10, no. 9, Mar. 1924, pp. 323-332 and (discussion) 332-334, 15 figs. Progress recently made in developing an equation which may be used by designer to predict numerical value of film coefficient of heat transfer between a clean pipe and water which is flowing through it in turbulent motion.

HEAT TREATMENT

Brass. See BRASS, Heat Treatment.

Cast Iron. See CAST IRON, Heat Treatment of.

Cost Accounting for. See COST ACCOUNTING, Heat-Treating Department.

Electrical Process. Annealing, Hardening, and Tempering by the Electrical Process. Machy. (Lond.), vol. 24, no. 609, May 29, 1924, pp. 263-265, 5 figs. Heat treatment of ferrous and non-ferrous wire and strip.

Furnaces. See ELECTRIC FURNACES, Heat-Treating.

Metals. See METALS, Heat Treatment.

Principles and Applications. Heat Treating—Its Principles and Applications, Chas. H. Fulton, H. M. Henton and Jas. H. Knapp. Serial article in Iron Trade Rev., vols. 74 and 75, beginning Jan. 10 and ending Oct. 23, 1924, 92 figs. Jan. 10: Heat treating in general. Jan. 24, Feb. 7, 21, Mar. 6 and 20: Normalizing and annealing. Apr. 3, 17, May 1 and 15: Hardening and tempering. May 29, June 12, 26, July 10 and 24; Carburizing and case-hardening. Aug. 7, 21 and Sept. 4: Heat treatment of alloy steels. Sept. 11, 25, Oct. 9 and 23: Electric furnaces.

Steel. See STEEL, HEAT TREATMENT OF.

Steel Castings. See STEEL CASTINGS, Heat Treatment.

Typewriter Parts. See TYPEWRITERS, Heat Treating of Parts.

HEATERS

Air-Blast, Characteristics of. See HEAT TRANSMISSION, Problems.

Water. See WATER HEATERS.

HEATING

Buildings. New Investigations on the Heat Requirement of Buildings and Heat Supply from Sources of Heat (Neue Untersuchungen über den

Wärmebedarf von Gebäuden und die Wärmeabgabe von Heizkörpen), E. Schmidt. Gesundheits-Ingenieur, vol. 47, no. 50, Dec. 13, 1924, pp. 585-590, 8 figs. Discusses heat losses through walls of buildings, temperature distribution in walls, etc., and gives charts for graphic determination.

The Calculation of Thermal Requirements in Buildings by Means of a Graphic Chart, J. N. Victor. Am. Architect, vol. 126, no. 2450, July 16, 1924, pp. 69-71. Chart is adapted to designing of steam, vapor, vacuum, and hot-water systems which employ direct, indirect, or coil radiation and for all temperature differences.

Central, Oil Fuel for. See OIL FUEL, Central Heating with.

China. Heating Situation in China, H. A. Alt. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, nos. 4, 8, and 10, Apr., Aug., and Oct., 9124, pp. 301-306, 589-596, and 669-675. Financial details; Aug.: Engineering side. Oct.: Contracting side.

Churches. Calculation of Heat Requirements of Churches (Die Berechnung des Wärmebedarfes für Kirchen), K. N. Metzkow. Gesundheits-Ingenieur, vol. 47, no. 42, Oct. 18, 1924, pp. 489-490, 4 figs. Discusses Rietschel formula to find quantity of heat required and proposes modification for its application to large churches.

Electric. See HEATING, ELECTRIC.

Flour-Mill. Using By-Products in Flour Mill Heating and Humidifying, E. K. Campbell. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 5, May 1924, pp. 349-358, 4 figs. Describes system installed in mill of Kansas Flour Mills Co., which seems to make available for use in heating a building all of by-product heat except that which is carried out in finished products.

Foundries. See FOUNDRIES, Heating.

Gas. See HEATING, GAS.

Hot-Air. See HEATING, HOT-AIR.

Hot-Water. See HEATING, HOT-WATER.

Oil Burners, Use in. Adapting the Oil Burner to Existing Heating Plants, H. R. Linn. Heat. & Vent. Mag., vol. 21, no. 5, May 1924, pp. 41-43. Notes on common installation and operating faults, with suggestions for overcoming these difficulties.

Steam. See HEATING, STEAM.

HEATING AND VENTILATION

Bank Vaults. Modern Heating and Ventilating Installations for Bank Vaults (Moderne Heizungs- und Lüftungsanlagen für Banktresore), Ortel. Gesundheits-Ingenieur, vol. 47, nos. 9 and 10, Mar. 1 and 8, 1924, pp. 65-68 and 73-76, 9 figs. Discusses correct and incorrect plant designs and describes examples of actual installations, after pointing out technical conditions governing design.

Code. Heating and Ventilating Code. Domestic Eng., vol. 105, no. 12, Dec. 22, 1923, and vol. 106, no. 2, Jan. 12, 1924, pp. 574-576 and 26-28, 2 figs. Condensed form of code of Wisconsin. See also Heat. & Vent. Mag., vol. 21, no. 2, Feb. 1924, pp. 84-87.

Factories. Factory Heating and Ventilation, A. G. King. Domestic Eng. (Chicago), vol. 108, nos, 3, 5, 9, and vol. 109, no. 4, July 19, Aug. 2, 30, and Oct. 25, 1924, pp. 20-23, 21-22 and 51-52, 31-35, and 29-33, 16 figs. For heating factory buildings three general methods are employed; direct heating by pipe coils or radiators, hot-blast heating using heater and fan, or by what is termed "unit heating."

Heat from Human Body, Effect of. Heat Given Up by the Human Body and its Effect on Heating and Ventilating Problems, C. P. Gagloglou. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 8, Aug. 1924, pp. 597-609, 5 figs. Analysis of existing data from technical viewpoint; influence of temperature, humidity, and air movement upon heat loss; influence of mechanical work; effect of body heat on heating and ventilating problems.

Office Buildings. Heating and Ventilating a Modern Office Building. Plumbers' Trade Jl., vol. 76, no. 3, Feb. 1, 1924, pp. 234-238, 8 figs. Description of $60,000 system in new Commercial building, Tulsa, Okla.

Practice. Some Comments on Present Day Heating and Ventilating Practice, W. S. Timmis. Am. Soc. Heat. & Vent. Eng.—Jl., vol. 30, no. 5, May 1924, pp. 395-403, 2 figs. Outlines results of recent investigations in heating and ventilating research.

Radiation Standard Formula for. The Movement Towards a Standard Radiation Formula. Heat. & Vent. Mag., vol. 21, no. 10, Oct. 1924, pp. 49-51, 1 fig. Principal features of rules compiled by Heating & Piping Contractors' Nat. Assn.

Research Work. Research Work for the Institution of Heating and Ventilating Engineers, Its Past, Present and Future, E. Herring. Domestic Eng. (Lond.), vol. 44, no. 7, July 1924, pp. 143-146. Abstract of paper read before Instn. Heat. & Vent. Engrs.

School Buildings. Heating and Ventilating an Up-to-date School Building, T. E. Mason. Plumbers' Trade Jl., vol. 76, no. 6, Mar. 15, 1924, pp. 499-502, and 504, 2 figs. Describes heating and ventilating system of high-school building now being erected in Saranac Lake, N. Y.; ventilating is of central fan system; vapor heating.

Theaters. Modern Ventilating in Theatre Building, M. J. Phillips. Plumbers' Trade Jl., vol. 76, no. 5, Mar. 1, 1924, pp. 406-408 and 455, 7 figs. Description of installation, at Fort Armstrong Theater, Rock Island, Ill., including system for heating in cold weather and cooling in summer months.

See also AIR CONDITIONING, Theaters.

HEATING, ELECTRIC

Advantages and Uses. The Place of Electricity in the General Heating Field, L. P. Hynes. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 1, Jan. 1924, pp. 17-24, 1 fig. Peculiar advantages of electric heat, and practical data for readily determining when and how to use it in solving some of the especially perplexing problems which confront heating engineer.

Apparatus. Electric Heating (Le chauffage électrique), G. Viel. Industrie Electrique, vol. 33, no. 766, May 25, 1925, pp. 185-189. Selection of apparatus to be employed; types of electric heaters and heating apparatus; heating of water for domestic purposes; electric cooking; electric heating of baking furnaces; heating of industrial furnaces and stoves; heating of buildings, apartments, and offices during winter.

Buildings. Electric Heating of Buildings (Elektrische Raumheizung), M. Hottinger. Gesundheits-Ingenieur, vol. 47, nos. 47 and 48, Nov. 22 and 29, 1924, pp. 549-556 and 561-570, 69 figs. Discusses Swiss conditions, and shows that even in great water-power countries general electric house heating is precluded. Details of resistance, electrode and induction heating, and examples of some installations. Electric heating of railway cars.

Central-Station. See CENTRAL STATIONS, Electric Heating, Sale of Current.

Church and Schoolroom. Notes on Electric Heating, Lulofs. Elec. Times, vol. 66, no. 1722, Oct. 16, 1924, pp. 441-445, 12 figs. With special reference to church and schoolroom heating.

Combination Cooking and Heating Oven. Recommendation for Utilization of Electric Energy for Cooking and Heating Purposes (Vorschlag zur Verwertung elektrischer Energie für Koch- und Heizzwecke), E. Boder. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 2, Feb. 1924, pp. 67-70, 4 figs. Investigates possibility of utilizing electric energy for calorific purposes in households and suggests scheme for simultaneous heating and kitchen and adjoining room, by means of electric ccoking and heat-storage oven.

Costs. Costs of Electric Heating, E. F. Collins. Elec. Wld., vol. 84, no. 17, Oct. 25, 1924, pp. 885-886. Basis of comparison from cost standpoint.

Holland. Progress in Application of Electricity for Heating and Domestic Purposes in Amsterdam (Le développement des applications de l'électricité au chauffage et aux usages domestiques à Amsterdam), W. Lulofs. Revue Générale de l'Electricité, vol. 16, no. 19, Nov. 8, 1924, pp. 749-758, 12 figs. Discusses electric pasteurizes for milk, heating of churches and schools, foot-warmers for traffic policemen, electric welding, etc.

Industrial. Electric Heating with Special Reference to Central Stations, E. D. Sibley. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 513-515, 1 fig. Shows present development of electric heating.

Electrical Heat in Industry, W. S. Scott. Elec. Wld., vol. 84, no. 25, Dec. 20, 1924, pp. 1307-1309. Basis for bringing conviction of value of its application.

Industrial Buildings. Using Electric Unit Heaters for Industrial Service, L. P. Hynes. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 8, Aug. 1924, pp. 581-587, 3 figs. Presents data which will help determine when and how to use electricity for industrial service.

Joule's Law. Joule's Law of Electric Heating: An Historical Sketch, W. W. Haldane Gee. Engineer, vol. 138, no. 3593, Nov. 7, 1924, pp. 519-520, 1 fig. Details of original experiments which enabled Jas. P. Joule to deduce this law.

Liquids. Electric Heaters for Liquids (Neuerungen an elektrischen Flüssigkeitserhitzern), Donath. Elektrotechnischer Anzeiger, vol. 41, nos. 89, 90-91, and 92, June 3, 5, and 7, 1924, pp. 451-452, 459-460, and 467-468, 8 figs. Discusses apparatus for electrode heating, resistance heating, and heating on induction principle, and describes various German patents.

Reflector Stoves. Distribution of Energy Emitted From a Reflector Electric Stove (Sulla distribuzione della energia emessa dalle stufe elettriche a riflettore), E. Carlevaro. Industria, vol. 38, no. 18, Sept. 30, 1924, pp. 493-498, 5 figs. Discusses energy transmitted in various directions, calculation of efficiency, and determination of losses.

Short and Long Duration. Bases for Solving Practical Heating Questions in Electrotechnics (Grundlagen zur Lösung praktischer Erwärmungsfragen der Elektrotechnik), M. L. Keller. Archiv für Elektrotechnik, vol. 13, no. 4, July 31, 1924, pp. 292-12 figs. Discusses heating equations for short and long duration, temperature diagram by Gut process, determination of overload factor, and course of temperature at continuously changing load.

HEATING, GAS

CO Hazards in. See CARBON MONOXIDE, Hazards from House Heaters.

Cost. Heating Rooms With Gas (Raumheizung mit Gas), K. Blume. Gas- u. Wasserfach, vol. 67, no. 38, Sept. 20, 1924, pp. 561-563, 1 fig. Discusses calculation of gas consumption, time and temperature of heating, comparison with coal, etc.

HEATING, HOT-AIR

Furnaces and Heating Systems. Investigation of Warm-Air Furnaces and Heating Systems, A. C. Willard, A. P. Kratz, V. S. Day. Univ. of Ill., Eng. Experiment Station—Bul., no. 141, May 1924, 149 pp., 91 figs. Details of investigation to determine efficiency and capacity of commercial warm-air furnaces; satisfactory and simple methods for rating furnaces; methods of increasing efficiency and capacity of furnace-heating equipment; heat losses in furnace heating systems; proper sizes and proportions of leaders, stacks, and registers; etc.

See also FURNACES, HOT-AIR.

Heater Selection. Basing Warm Air Heater on Selection on Climatological Condition and Heater Performance Curves, V. S. Day. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 12, Dec. 1924, pp. 753-760, 5 figs. Requirements of a warm-air heater. Importance of climatological temperature conditions in selection of furnace sizes and types. Table showing wide variation in heating-season mean temperatures, coldest-month temperatures, and coldest-liability temperatures for various sections of United States. Graphs showing average annual temperature for Chicago, application of these temperature data on furnace selection problem, and performance for two heaters having same grate diameters.

Houses. Principles of Design in Furnace Heating. Serial article in Sheet Metal Worker, vol. 15, beginning Apr. 11, and ending Dec. 5, 1924, 51 figs. Apr. 11: General outline of procedure to be followed in designing a gravity warm-air heating installation. May 9: Factors affecting determination of leader sizes. June 6: Simplified method of determining leader sizes, based on standard code for regulating installation of warm-air furnaces in residences. July 4, 18, Aug. 15, 29, Sept. 12 and 26: Factors affecting determination of wall stack sizes. Nov. 7: Effect of various insulating coverings for leaders and heat loss therefrom. Nov. 21: Effect of insulation of warm-air leader pipes upon plant operation. Dec. 5: Relation between stack size and temperature drop.

See also HEATING, HOUSE, Hot-Air Unit Heaters.

Plants. A Modern Air Heating Plant (Eine neuartige Luftheizung), O. Redzich. Wärme- u. Kälte-Technik, vol. 26, no. 19, Oct. 1, 1924, pp. 179-180. Construction of a modern heating plant; air-heating apparatus; low-pressure turbo-ventilators; air-conditioning plants; operation of plants.

Return-Air Intakes, Position of. Inside Air Circulation, Benj. F. Burger. Sheet Metal Worker, vol. 15, no. 24, Dec. 19, 1924, pp. 908-909, 3 figs. Its position and bearing upon position of warm-air registers.

Wall Stacks for Gravity Systems. Selecting Wall Stacks Scientifically for Gravity Warm Air Heating Systems, V. S. Day. Am. Soc. Heat. & Vent. Eng.—Jl., vol. 30, no. 5, May 1924, 391-394, 2 figs. Presents curves showing heating effect obtainable at registers for variety of stack areas and register for air temperatures.

Waste-Heat Utilization. Air Heating by Means of Steam, Exhaust Steam or Other Waste Steam with Blower Operation (Luftheizung mit Dampf, Abdampf oder sonstiger Abwärme und mit Ventilatorbetrieb), K. Redzich. Gesundheits-Ingenieur, vol. 47, no. 30, July 26, 1924, pp. 329-330. Discusses air heaters, low-pressure turbo blowers, operation of heating plant by using any kind of waste steam, air-humidifying plant, etc.

HEATING, HOT WATER

Central-Station. Use of Mechanical Devices in Central Hot-Water and Steam Heating Plants

(Emploi d'organes méchaniques dans les installations de chauffage central par l'eau et la vapeur), A. Nessi. Chaleur & Industrie, vol. 5, no. 52, Aug. 1924, pp. 389-396, 9 figs. Discusses use of centrifugal pumps, vacuum pumps, fans, and their operation in connection with heating plants; reduction of fuel consumption.

Circulation. Hot Water Heating With Moderately Accelerated Circulation Without Motor (Warmwasserheizung mit mässig beschleunigtem Umlauf ohne Motor), O. Schmidt. Gesundheits-Ingenieur, vol. 47, no. 31, Aug. 2, 1924, pp. 338-341, 3 figs. Details of Presto system, by Lincke A. G. Zürich, and of author's system, both having moderate circulation of hot water.

Effective Pressures in Systems. Theory of the Effective Pressures in Hot-Water Heating Systems (Theorie des wirksamen Druckes in Warmwasserheizungen), M. Wierz. Gesundheits-Ingenieur, vol. 47, no. 18, May 3, 1924, pp. 159-164, 14 figs. Forces which produce circulation are computed for various types of hot-water heating systems. Investigations are limited to cases where flow has attained constant conditions.

Gravity Systems. A Short, Practical Method of Designing Gravity Water Heating Systems, F. E. Giesecke. Heat. & Vent. Mag., vol. 21, nos. 1, 2, 4, 6, 8 and 10, Jan., Feb., Apr., June, Aug., and Oct., 1924, pp. 41-47, 59-61, 47-51, 45-50, 53-55, and 52-57, 18 figs. Six illustrative problems frequently encountered in practice, and their solutions.

Greenhouses. Hot Water Heating by Forced Circulation, T. N. Thomson. Plumbers Trade Jl., vol. 76, no. 6, Mar. 15, 1924, pp. 492-494, 3 figs. Practical methods for laying out a hot water forced circulation system for large commercial greenhouse with individual automatic temperature regulation for each house.

Hot-Water for Greenhouse Heating, F. J. Elder. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 9, Sept. 1924, pp. 619-626, 11 figs. Discusses temperature requirements, radiation, piping, etc.

Institution Plant. An Institution Hot-Water Plant. Power Engr., vol. 19, no. 215, Feb. 1924, pp. 57-62, 14 figs. Arrangements for warming scattered buildings and wards of average-sized institution for poor, and for supply of hot water for domestic purposes.

Pipe Calculation. Calculation of Pipes for Hot-Water Heating (Rohrbemessung für Warmwasserheizungen. Vergleichende Betrachtungen der verschiedenen Rechnungsweisen), H. Behrens. Gesundheits-Ingenieur, vol. 47, nos. 27 and 28, July 5 and 12, 1924, pp. 285-290 and 297-303, 13 figs. Compares various methods of calculation and finds Brabée's best; applies Brabée's figures in construction of tables for rapid calculation of sizes.

Radiators. See RADIATORS.

Single-Floor. Calculation of Hot-Water Heating by Floors (Die Berechnung der Etagenwarmwasserheizung), M. Wierz. Gesundheits-Ingenieur, vol. 47, no. 32, Aug. 9, 1924, pp. 345-347, 1 fig. Discusses heating of single floors in place of central heating and makes calculations of pressures, piping, etc.

Steam vs. See HEATING, STEAM, Hot-Water vs.

Water in Pipes, Friction of. Effect of Temperature upon the Friction of Water in Pipes, F. E. Giesecke. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 12, Dec. 1924, pp. 747-752, 3 figs. Calculations for determining how friction varies with temperature of water, in connection with calculations relating to water heating.

HEATING, HOUSE

[See also HEATING, ELECTRIC; HEATING, HOT-AIR; HEATING, HOT-WATER; HEATING, STEAM.]

Economic Installations. The Economic Design of House-Heating Installations (Die wirtschaftliche Gestaltung der Raumheizanlagen), P. Beck. Archiv. für Wärmewirtschaft, vol. 5, no. 3, Mar. 1924, pp. 41-45. Comparison of stove and central heating; possibilities for improvement of central heating plants; making use of radiation and pipe losses; reduction of chimney losses; use of low-grade fuel.

Fuel Economy in. See FUEL ECONOMY, Home Heating.

Gas. Practical Notes on House-heating by Gas. Heat. & Vent. Mag., vol. 21, no. 12, Dec. 1924, pp. 43-47, 6 figs. Data compiled by Am. Gas Assn.; includes chart for estimating gas requirements for steam, water and warm-air heating systems, and explains how to use chart; cross-connecting coal and gas boilers; thermostatic control.

Hot-Air Unit Heaters, Gas-Fired. Study of the Unit Hot Air Heater; Its Possibilities as a Gas Fired Space Heating Appliance, H. DeW. Valentine. Gas Age-Rec., vol. 53, no. 15, Apr. 12, 1924, pp. 467-469 and 506, 1 fig. Essentially a diminutive warm-air furnace, made of sheet metal throughout, heating surfaces being so designed as to form air-heating chambers which are contiguous passages which carry flue gases, paths of which are in a counter direction to path of air being heated. Results of series of tests on a unit heater.

Oil. Heating the Small Residence With Oil, C. F. Olmsted. Sheet Metal Worker, vol. 15, no. 6, Apr. 11, 1924, pp. 197-198 and 232. Regulations of Nat. Board of Fire Underwriters for construction and installation of oil-burning equipments for domestic use and for storage and use of oil fuels used in connection therewith as recommended by Nat. Fire Protection Assn.

Oil Burners. Oil Burners for Residential Property, A. C. Carruthers. Safety Eng., vol. 47, no. 2, Feb. 1924, pp. 60-64, 3 figs. Principal data on ten oil burners, for installation in various types of hot-water heaters, steam boilers, and hot-air furnaces, which have received approval of Underwriters' Laboratories. Regulations issued for their construction and use.

Oil-Fired-Boiler Efficiency. Efficiency of the House-Heating Oil-Fired Boiler, J. L. Breese, Jr. Heat. & Vent. Mag., vol. 21, no. 5, May 1924, pp. 51-54. Difficulties which have to be met and overcome in this new field, based upon experiences of an oil-burning boiler manufacturer. From paper read before Am. Assn. Oil Burner Mfrs.

Steam. Plans for Heating a Twelve-Room Residence, T. N. Thomson. Plumbers Trade Jl., vol. 77, no. 1, July 1, 1924, pp. 33, 36-37 and 80, 8 figs. Description of one-pipe low-pressure steam heating system in modern residence. Reliable rules for proportioning radiators, boiler, and piping.

Theory. Scientific Principles in Heating (Wissenschaftliches Denken in der Heizungstechnik), O. Knoblauch. Gesundheits-Ingenieur, vol. 49, no. 47, Dec. 6, 1924, pp. 573-577, 9 figs. Discusses heat transmission and losses, limit layer theory and law of similarity, and laws of thermodynamics.

Vapor. Vapor Heating System For Small Dwellings, T. E. Mason. Plumbers' Trade Jl., vol. 76, no. 4, Feb. 15, 1924, pp. 330-331 and 334, 4 figs. Details of an actual installation in representative building situated in high altitude territory.

HEATING, STEAM

Central. Additional Steam Lines and Plant of the New York Steam Corporation. Power, vol. 60, no. 21, Nov. 18, 1924, pp. 807-808, 2 figs. Steam for both power and heat is distributed at 125-lb. gage, while generation will be at 200 lb., in proposed new steam station; steam in all cases is utilized directly from boilers without power production before entering distributing mains.

Another Central Heating System Turns to Live Steam, L. E. Young. Heat. & Vent. Mag., vol. 21, no. 11, Nov. 1924, pp. 41-44, 6 figs. Details of 1924 construction program of Union Elec. Light & Power Co., St. Louis, Mo., which is substituting high-pressure steam operation from a central plant for isolated and interconnected plant service.

Applying Centralized Control to Steam Heating Systems. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 417-419, 5 figs. How central-station steam was supplied to an office building and what arrangements were made for heating a factory where public-utility power had supplanted that from a private plant.

Central Heating Plant At Grand Rapids. Power, vol. 60, no. 2, July 8, 1924, pp. 42-46, 2 figs. Description of a high-pressure central heating plant in which exhaust steam and steam bled from non-condensing turbo-generator is utilized for stage feedwater heating and for supply to heating mains at three different pressures. Boiler pressure 350 lb. gage, 200 deg. fahr. superheat. Furnace air preheating, low-pressure economizers, venturi stacks.

Central Station Heating Proves Successful, H. A. Woodworth. Power Plant Eng., vol. 28, no. 7, Apr. 1, 1924, pp. 377-380, 3 figs. Discusses factors contributing to successful systems of central-station heating.

Central Station Heating Requirements, H. A. Woodworth. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 658-662, 7 figs. Conservation of fuel due to double use of steam, that is, for electric generation and commercial heating purposes; modern heating system at Grand Rapids, Mich.; modern underground construction.

Distribution and Regulation of Heat in Central Heating Plants (Distribution et Réglage de la Chaleur dans les installations de chauffage central par l'eau et la vapeur), A. Nessi and L. Nisolle. Chaleur & Industrie, vol. 4, no. 44, Dec. 1923, pp. 945-951 and vol. 5, no. 45, Jan. 1924, pp. 27-32, 6 figs. Discusses means and possibilities of improving economic efficiency of central heating stations.

District Steam Heating Proves Economical, H. A. Woodworth. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1107-1110, 5 figs. System using high-pressure steam in St. Louis business districts shows considerable saving over use of isolated plants.

General Distribution of Heat in Buildings by Means of Central Heating Stations (Repartition générale de la chaleur dans les immeubles au moyen de centrales thermiques), A. Nessi. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Traveaux, vol. 77, no. 1-2-3, Jan.-Mar. 1924, pp. 113-142, 12 figs. Discusses efficiency in heat production and distribution, centralized distribution, use of exhaust heat for power purposes, and benefits arising from greater centralization.

Low Pressure Steam for District Heating, H. A. Woodworth. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 763-768, 4 figs. Service to customers insures success. Estimating radiation, advantages of district heating, customer's installations, atmospheric steam heating, and operation of a heating system.

Measuring Quantity of Heat in Central Heating Plants (Wärmemengenmessung bei Zentralheizungsanlagen), M. deGrahl. Archiv für Wärmewirtschaft, vol. 5, no. 6, June 1924, pp. 109-110, 2 figs. Discusses various types of meters for measuring quantity of heat in steam and hot-water heating plants, by Zähler-Heizungsgesellschaft, Siemens & Halske, and Krauser.

Oil Firing in Central Heating Plants (Oilfeuerungen für Zentralheizungen), Gesundheits-Ingenieur, vol. 47, no. 38, Sept. 16, 1924, pp. 439-443, 9 figs. Discusses design of oil burners and oil firing plants for various types of boilers.

Rhenish Lignite Briquets in Central Heating Plants (Das rheinische Braunkohlenbrikett in Zentralheizungen), H. M. Kaspers. Feuerungstechnik, vol. 12, no. 24, Sept. 15, 1924, pp. 210-214, 6 figs. Most important types of boilers for briquet firing and their efficiency.

The Economical Utilization of Heat from Central Station Plants, N. W. Calvert and J. E. Seiter. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 1, Jan. 1924, pp. 1-16, 15 figs. Shutting off of steam at night and during day; thermostatic control; vacuum systems; building details for efficient heating; data on heat consumption; etc.

The Municipal Central Heating Station in Barmen, Germany (Das städtische Fernheizwerk Barmen), Schilling. Gesundheits-Ingenieur, vol. 47, nos. 15 and 17, Apr. 12 and 26, 1924, pp. 115-119 and 145-148, 10 figs. Details of boiler station consisting of 4 water-tube boilers, each having 180 sq. m. heating surface; steam pipe-line distribution system; steam pressure-reduction stations and stations for conversion of steam into hot water; operation of plant; numerous investigations show economy of central-heating system.

The Rise of Steam Flow Meters in Central Station Heating Service, H. Allen. Heat. & Vent. Mag., vol. 21, no. 8, Aug. 1924, pp. 48-52, 8 figs. How practice has developed of selling steam at source of supply, due to additional demand for free steam for cooking and general industrial use.

District. See Central.

Hot-Water vs. Comparative Tests of Heating Systems. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 783-784, 2 figs. Intermediate-type thermostats are said to be superior to positive; automatic control from central point; results of tests to determine practical disadvantages rather than quantitative savings; heating requirements for steam and hot-water systems in two hotels were compared. (Abstract.) Report of Heat Utilization Committee before Nat. District Heating Assn.

Houses. See HEATING, HOUSE, Steam.

Low-Pressure. Low-Pressure Steam Heating (Niederdruckdampfheizung), J. Körting. Gesundheits-Ingenieur, vol. 47, nos. 38 and 39, Sept. 16 and 27, 1924, pp. 444-447 and 454-457, 2 figs. Discusses arrangement of plant in order to secure good results, and gives details of various plants in operation. Results of tests with an experimental plant of Körting A. G.

Metallurgical Plants. Heating Officers and Shops of Metallurgical Plants (Le chauffage des bureaux et ateliers aux usines sidérurgiques), E. Lavandier. Revue Universelle des Mines, vol. 3, no. 1, series 7, July 1, 1924, pp. 6-25, 6 figs. Discusses principal heating systems, their cost and losses, and describes heating arrangements at Differdange plant, using exhaust steam and blast furnace gas.

Oil-Burning System. Oil Burning Equipment, M. Griffith. Plumbers' Trade Jl., vol. 76, no. 4, Feb. 15, 1924, pp. 326-329, 7 figs. Details of storage tanks, apparatus and piping installation for large office building in accordance with requirements of Nat. Board of Fire Underwriters.

Practice. Modern Steam Heating, A. J. Asshe-ton. Domestic Eng. (Lond.), vol. 44, nos. 1 and 2, Jan. and Feb. 1924, pp. 3-10 and 33-35, 12 figs. Discusses decomposition of air impurities and purities; course of convection currents; object of air eliminator; pipe sizes; vapor, mechanical return, and vacuum systems; etc.

Pressure Regulators. Practical Notes on the Use of Pressure Regulators and Pressure-Reducing Valves, T. H. Ireland. Heat. & Vent. Mag., vol. 21, no. 2, Feb. 1924, pp. 50-53, 5 figs. Common errors to avoid in application of these devices, based upon a large experience in the field.

Radiators. See RADIATORS.

Return Lines, Flow in. See FLOW OF WATER, Return Lines.

Superpower vs. District Heating. Super-Power Versus District Heating, H. A. Woodworth. Nat. Engr., vol. 28, no. 12, Dec. 1924, pp. 579-582, 1 fig. Discussion on importance of heating requirements in relation to economical power generation for industrial power and district heating service; factors to be considered in design and counstruction of central-heating system; combined heating and power service most successful.

Systems for Large Cities. Economics of Our National Power and Heating Problem, E. Douglas. Nat. Engr., vol. 28, no. 12, Dec. 1924, pp. 598-601. Heating methods in large industrial plants; development of central-heating systems; heating situation in large American cities; modern methods of heating residence sections in cities; New York's unusual heating system; relation of heating and electrical requirements.

Unit Heaters. The Trend in the Unit Heater Field, A. H. Greene. Heat. & Vent. Mag., vol. 21, no. 3, Mar. 1924, pp. 55-57, 4 figs. Special reference to use of copper and brass radiators as a means of reducing size and weight and increasing efficiency.

Vacuum. Calculation of Vacuum-Steam Pipe Lines by Using Brabbée's Tables (die Berechnung von Vakuum-Dampfrohrleitungen bei Verwendung der Brabbéeschen Tafeln), A. Weindorfer. Gesundheits-Ingenieur, vol. 47, no. 30, July 26, 1924, pp. 324-325, 2 figs. Gives simple method of calculating steam pipe lines for vacuum heating.

Vacuum Steam Heating Plants [Unterdruck-heizungen (Vakuum - Dampfheizungen)], J. Schmidt. Gesundheits-Ingenieur, vol. 47, no. 33, Aug. 16, 1924, pp. 358-362, 2 figs. Describes low-pressure steam-heating plants, comparing them with conventional steam-heating plants; gives table of pipe diameters.

HEAVY-OIL ENGINES. See OIL ENGINES.

HELICOPTERS

Aerodynamics and Construction. An Introduction to the Helicopter. A. Klemin. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 739-751, 15 figs. Review of aerodynamic and construction data thus far available, together with descriptions of number of modern helicopters; difficulties to be met; lines of development open; possible uses.

Developments, 1923. See AERONAUTICS, Developments.

Oehmichen. First Helicopter to Fly a Circular Kilometer. Aviation, vol. 17, no. 7, Aug. 18, 1924, pp. 888-889, 1 fig. Details of apparatus and flight which met test imposed by French Air Service. Translated from Aéronautique.

HELIUM

Canada. Helium in Canada, R. T. Elworthy. Can. Min. Jl., vol. 45, no. 51, Dec. 19, 1924, pp. 1233-1235. Deals with helium versus hydrogen, proved superiority of helium, sources of helium in Canada, and steps required for progress.

Discovery and Properties. Helium, Thos. E. Doubt. Armour Engr., vol. 16, no. 1, Nov. 1924, pp. 8, 31, and 34. Account of its discovery and properties.

Electrical Properties. Electrical Properties of Helium, J. S. Townsend and S. P. McCallum. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl., Sci., vol. 47, no. 279, May 1924, pp. 577-583, 6 figs. Investigation of conductivity of gases, in order to decide by direct experiment whether there are any additional electrons set free from negative electrode by radiation from molecules of gas, using potentials and gas pressures as in parallel plate experiments where current increases with distances between plates in accordance with given formula.

Sources and Extraction Processes. Helium Sources and Extraction Process, R. R. Bottoms. Oil & Gas Jl., vol. 23, no. 26-A, Nov. 20, 1924, pp. 20, 76, 78, and 80. Story of helium as it exists in United States; nature of the natural gas of Canada and in the Old World in respect to its helium content which is smaller than that of United States; shows percentage of helium contained in samples analyzed.

HIGH PRESSURES

Measurement. See MANOMETERS, High-Pressure.

HIGH-SPEED STEEL. See STEEL, HIGH-SPEED.

HIGH VOLTAGES

Corona. See CORONA.

Measurement. Temperature and Pressure Correction Chart for a Sphere Gap, R. H. Marvin. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 34-35, 2 figs. Describes use of straight-line chart when correction has to be made to indicated voltage for variations of either temperature or barometric pressure from standard values.

1,000,000-Volt Testing Station. The 1,000,000-Volt Testing Station of the Hermsdorf-Schomburg Insulator Corpn. in the Freiberg Porcelain Factory [Das 1,000,000 V-Versuchsfeld der Hermsdorf-Schomburg-Isolatoren G. m. b. H. in der Porzallenfabrik Freiberg (Sa.)]. Elektrotechnische Zeit., vol. 45, no. 10, Mar. 6, 1924, pp. 177-180, 12 figs. Describes testing station which is first in Europe generating voltages of 1,000,000-volt alternating current.

Phenomena. High-Voltage Phenomena, F. W. Peek, Jr. Franklin Inst.—Jl., vol. 197, no. 1, Jan. 1924, pp. 1-44, 29 figs. Results of author's research work at voltages up to 1,000,000 volts above ground, 1,500,000 single-phase, and 1,000,000 3-phase 60-cycle root mean square values; corona laws established at lower voltages were checked as well as spark-over values of needle gaps, sphere gaps, line insulators and other typical electrodes.

Research. High Voltage Phenomena, G. Faccioli. West. Soc. Engrs.—Jl., vol. 29, no. 12, Dec. 1924, pp. 431-442, 22 figs. Describes behavior of different circuits under conditions that sometimes occur in operation and explains why unexpected failures have developed. Describes some results obtained in special laboratory equipped to measure time in millionths of a second and dealing with voltages in the millions, which was constructed to study these high-voltage, high-frequency phenomena.

Testing Field for. Million-Volt Testing Field of the Hermsdorf-Schomburg Insulator Co. at the Porcelain Factory of Freiberg in Saxony (Das 1,000,000 V-Versuchsfeld der Hermsdorf-Schom-

burg-Isolatoren-G. m. b. H. in der Porzellanfabrik Freiberg, Sachsen), O. Naumann. Elektrotechnik u. Maschinenbau, vol. 42, no. 26, June 29, 1924, pp. 405-413, 20 figs. Describes testing field, layout and equipment; flashover of various spark gaps, string insulators, etc.

HIGHWAYS

[See also ROADS.]

Banff-Windermere, Can. The Banff-Windermere Highway, J. M. Wardle. Eng. Jl., vol. 7, no. 2, Feb. 1924, pp. 91-94, 7 figs. New highway, opened for traffic on June 30, 1923, extends from town of Banff, Alberta, to Windermere district in Columbia River valley; total length is 93 mi.; construction problems; crowning and ditching.

Black Base. Black Base in New Jersey and Kansas. Public Works, vol. 55, no. 8, Aug. 1924, pp. 248-250, 3 figs. Gives cost and details of construction.

Black Base Highway Construction, H. F. Harris. Can. Engr., vol. 47, no. 6, Aug. 5, 1924, pp. 221-223. 2 figs. Method employed in Mercer County, N. J., for constructing black base pavement; typical analysis of material used; preparatory measurements of road; advantages of method adopted; cost of constructing pavement.

British Columbia. Highway System of British Columbia, P. Philip. Can. Engr., vol. 46, no. 9, Feb. 26, 1924, pp. 269-272, 1 fig. Review of history and development of provincial highways; mileage and location of principal highways in province.

Concrete. 1924 Road Program Involves Large Steel Tonnage, R. T. Mason. Iron Trade Rev., vol. 75, no. 6, Aug. 7, 1924, pp. 349-352, 6 figs. Discusses general favor of concrete roads, increased use of steel reinforcement, details of state programs of construction.

Tentative Conclusions on the Design of Concrete Highways, C. Older. Mun. & County Eng., vol. 66, no. 3, Mar. 1924, pp. 103-111, 9 figs. Developments during 1923 in Illinois highway research work, and their probable bearing upon problem of rural pavement design.

Construction and Design. Consideration in the Design and Construction of Highways, P. Philip. Eng. Jl., vol. 7, no. 9, Sept. 1924, pp. 602-603. Relation of design of Highways and limitations imposed on motors using them.

State Highway Construction in 1923 and 1924. Eng. & Contracting (Roads and Streets), vol. 61, no. 1, Jan. 2, 1924, pp. 36-51. Reports from state officials showing mileage and expenditures in 1923 and proposed mileage and funds available for 1924.

Cost Accounting. Cost Keeping on County Highway Work, A. K. Hay. Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 741-745, 9 figs. System used by Ottawa Suburban Roads Commission, Ottawa, Ont.

Highways Cost Accounts, G. Thomas. Surveyor & Mun. & County Engr., vol. 65, nos. 1674, 1676, and 1677, Feb. 15, 29 and Mar. 7, 1924, pp. 209-211, 233-236, and 261-264, 4 figs. Résumé of history of cost accountancy in general with special reference to highways cost accounts. Details of cost allocation, and forms, books and accounts necessary for working of a standard highway costing system which author suggests as being suitable and practicable for highway departments. Diagrams showing inter-relation of the various cost forms and cost accounts, and relations necessary between highways cost accounts system and treasurer's financial accounts.

Development. Points of Interest in Highway Development, E. O. Hathaway. Minnesota Federation of Architectural & Eng. Soc.—Bul., vol. 9, no. 8, Aug. 1924, pp. 11-18. Discusses finances, publicity and education, investigations, design, materials, construction and maintenance, and statistics.

Embankment across Tidal Marsh. Highway Embankment Construction Across Tidal Marsh (Wilmington, Del.), W. W. Mack. Eng., News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 233-234, 2 figs. Vertical settlements of 40 ft. recorded; construction simply task of dumping enough material.

France. The Road Question in France (La question des routes en France), M. P. LeGavrian. Revue de l'Ingénieur, Apr. 1924, pp. 39-172, 101 figs. Series of articles on road construction and improvement, covering surfacing and paving by means of agglomerate, bitumen, asphalt, tar macadam, hydraulic binders, etc.; materials, machinery, and apparatus used in road building, and processes of construction.

Future. Highways of the Future (Die Strasse der Zukunft), J. Prix. Verkehrstechnik, vol. 41, no. 44, Oct. 31, 1924, pp. 545-547. Discusses work of the four international congresses on highways; development of motor truck traffic in Europe and America; systematic highway construction, and machinery used.

Jamaica Bay, L. I. The Design and Construction of the Jamaica Bay Boulevard, C. T. Steiner. Mun. Engrs. Jl., vol. 10, 1924, pp. 71-94, 8 figs. See also Mun. & County Eng., vol. 67, no. 1, July 1924, pp. 45-50. Details of design and construction including reinforced-concrete trestle carried on reinforced-concrete piles.

Lighting. See LIGHTING, Highways; Street.

Motor Traffic. Trunk-Highway Motor-Traffic, W. G. Sloan. Soc. Automotive Engrs.—Jl., vol. 15, no. 3, Sept. 1924, pp. 238-245 and (discussion) 245-250, 12 figs. Discusses effect of development of motor-vehicle industry on property values, probable future conditions, improvements at Camden, revenue available for building roads, requirements for satisfactory highways, best wearing surfaces, adjustment of gradients, etc.

New York-San Francisco. The Victory Highway, B. Blow. Good Roads, vol. 66, no. 6, June 1924, pp. 159-160 and 186, 4 figs. National memorial road from New York to San Francisco conceived in honor of those who served in World War.

Nova Scotia. Highway Construction in Nova Scotia, R. W. McColough. Can. Engr., vol. 47, no. 7, Aug. 12, 1924, pp. 229-231, 8 figs. About 14,580 mi. of roads in province create difficult problem owing to conditions prevailing; mileage of different types of road reconstructed; financing road projects; highway maintenance methods.

Quebec, Canada. Status of Provincial Highways, Quebec, J. L. Boulanger. Can. Engr., vol. 46, no. 5, Jan. 29, 1924, pp. 193-195. Review of highway situation in Province of Quebec giving mileage of roads completed and under construction, also summary of work done by Provincial Department of Roads during 1923.

Research. Highway Research in Illinois, C. Older. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 2, Feb. 1924, pp. 175-217, 26 figs. Describes series of research projects carefully planned to give insight and understanding of unsolved problems of rural pavement design; methods used in investigations, data obtained, and tentative conclusions drawn from these studies.

Proceedings of the Third Annual Meeting of the Advisory Board on Highway Research, Division of Engineering, National Research Council. Nat. Research Council—Bul., vol. 8, no. 43, Mar. 1924, 162 pp., 11 figs. Summary of development and by-laws of Advisory Board; committee reports on

economic theory of highway improvement, structural design of roads, and character and use of road materials; Objectives in Highway Research, Thos. H. MacDonald; Highway Research Work of Am. Assn. of Land Grant Colleges, A. Marston; report of committee on highway finance; Research Program of North Carolina State Highway Commission, Chas. M. Upham; reports of committees on highway-traffic analysis and maintenance.

Some Recent Developments in Highway Research. Eng. News-Rec., vol. 93, no. 24, Dec. 11, 1924, pp. 957-959. Abstracts of reports of committees of Advisory Board on Highway Research, as follows: Objects and methods of Highway Transportation Surveys, G. E. Hamlin; Structural Design of Highway, A. T. Goldbeck; Disk Shear Test for Road Soils, C. M. Strahan.

Safety. Uniform Signs and Regulations Needed to Promote Traffic Safety. Automotive Industries, vol. 51, no. 11, Sept. 11, 1924, pp. 492-494, 2 figs. Defects which should be avoided in road construction. Modern highway design is helping materially to reduce number of accidents. Drivers should be responsible for keeping brakes in good condition, highway official says.

Specifications. Preparation of Highway Specifications, A. S. Macmillan. Can. Engr., vol. 47, no. 3, July 15, 1924, pp. 152-154. Discusses features from contractors viewpoint contained in paper presented at annual convention of Can. Good Roads Assn.; respecting contractor's interests; position of engineer.

Structural Design. Researches on the Structural Design of Highways by the United States Bureau of Public Roads, A. T. Goldbeck. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 4, Apr. 1924, pp. 453-489, 26 figs. Researches on sub-grade; loads on pavements; stresses in concrete pavements; Pittsburg, Cal.; test road, studies in materials; miscellaneous investigations.

Traffic Accidents. Highway Traffic Accidents, N. M. Isabella. Eng. & Contracting (Roads & Streets), vol. 61, no. 2, Feb. 6, 1924, pp. 291-295. Classification, causes, and preventive measures. See also Highway Engr. & Contractor, vol. 10, no. 2, Feb. 1924, pp. 69-72.

Traffic in California. Highway Traffic in California, L. I. Hewes. Pub. Roads, vol. 5, no. 10, Dec. 1924, pp. 10-15, 5 figs. Applications of traffic counts made by Bur. of Public Roads; comparison of 1920 and 1922 traffic counts; California and Connecticut traffic surveys compared; statistics indicate life of vehicles.

Wisconsin. Wisconsin's New 10,000 Mile State Trunk Highway System, J. T. Donaghey. Mun. & County Eng., vol. 66, no. 3, Mar. 1924, pp. 116-120, 5 figs. Describes maintenance, marking, shape warning signs, traffic service, etc.

HOBBING MACHINES

Bevel-Gear. A New Bevel-Gear Hobbing Machine for Producing Theoretically and Practically Exact Helical Teeth (Eine neue Kegelradhobelmaschine zur Erzeugung theoretisch und praktisch genauer Schraubenverzahnung), F. Theimer. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 651, 653, 5 figs. Describes Brandenberger patent which combines rectilinear movement to and fro of plane with simultaneous rotation of wheel round its axis.

Brown & Sharpe. A New Gear Hobbing Machine. Automobile Engr., vol. 14, no. 187, Mar. 1924, p. 75, 1 fig. Describes new Brown & Sharpe spurgear hobber.

Gould & Eberhardt. Gould & Eberhardt No. 72-H Automatic Gear Hobbing Machine. Am. Mach., vol. 60, no. 118, May 1, 1924, pp. 669-670, 2 figs. Adapted for cutting of gears up to 27 in. in diam.

See also Spur-Gear.

Lees-Bradner. Gear Hobbing Machine Specially Designed for Producing Transmission Gears. Automotive Industries, vol. 51, no. 9, Aug. 28, 1924, pp. 402-404, 5 figs. Describes gear generator specially designed for production of automobile transmission gears, developed by Lees-Bradner Co., Cleveland, Ohio. Straddle housing eliminates overhang of work and hob spindle, and adds rigidity of support, which is claimed to increase speed of production, life of hob and number of gears cut for each sharpening.

New Type. New Gear Hobber. Iron Age, vol. 113, no. 5, Jan. 31, 1924, pp. 361-362, 3 figs. Machine for quantity production of spur and helical gears; drive arrangement a feature.

Spline. Sommer & Adams Rotary Spline Hobbing Machine. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 555-556, 3 figs. Describes multiple-spindle machine in which eight pieces of work are finished by as many hobs, while practically entire machine, with exception of base, revolved past operator; it is believed same principle can be applied to hobbing of gears.

Spur-Gear. An Interesting Gear Cutting Development. British Machine Tool Eng., vol. 3, no. 27, May-June 1924, pp. 61-62, 1 fig. Describes automatic, super-gear hobbing machine.

New Hobbing Machine Specially Designed to Rough and Finish Gears. Automotive Industries, vol. 50, no. 7, Feb. 14, 1924, pp. 347-348, 3 figs. Machine made by Gould & Eberhardt can be used for production of both spur and helical types in quantities; also adapted to diversified range of work.

HOISTS

Coke. See COKE HANDLING, Hoists.

Electric. An Electric Hoist Controlled by Compressed Air, H. V. Haight. Can. Min. Jl., vol. 45, no. 8, Feb. 22, 1924, pp. 175-180, 8 figs. Particulars of two hoists recently built for use in Porcupine camp; double drum type, the two drums being on one shaft and intended for operating normally in balance; both drums provided with band friction clutches so that either may be operated independently; drive is through single-reduction Falk herringbone gearing; 250-hp. 550-volt 60-cycle slip-ring hoist motor; designed for maximum rope pull of 12,000 lb. and a depth of 2000 ft.

Electric Drives for Mine Hoists, L. A. Umansky. Coal Industry, vol. 7, no. 2, Feb. 1924, pp. 75-82, 13 figs. Economic comparison of various systems in use; induction-motor drive and Ward-Leonard control with flywheel motor generator set.

Large Electric Winders at the Randfontein Central Gold Mining Company, Limited, Chas. Miles and A. W. Stoker. S. African Instn. Engrs.—Jl., vol. 22, no. 6, Jan. 1924, pp. 77-93 and (discussion) 93-94, 22 figs. Details of mechanical and electrical portions; designed to hoist rock load of 10,000 lb. from depth of 3000 ft.; gear is operated by Ward-Leonard system with two main 2500-hp. motors.

Things It Pays to Know About the Operation and Selection of Small Hoists, R. B. Hunter. Indus. Engr., vol. 82, no. 11, Nov. 1924, pp. 527-530 and 554, 12 figs. Operating features of control, brakes, and overtravel protection of different designs.

Hydraulic Drive for. See HYDRAULIC DRIVE.

Mine. Novel Application of Dynamic Braking on Large Slope Hoist, R. W. McNeill. Coal Age, vol. 25, no. 2, Jan. 10, 1924, pp. 35-39, 8 figs. Peculiar requirements of hoisting and lowering speeds under widely differing loads while handling coal, supplies, and men necessitates unusual type

of control; success of installation at Shenandoah, Pa., proves efficacy of plan.

Novel Features of Electric Mine Hoists Recently Installed in Northern Ontario, H. V. Haight. Elec. News, vol. 33, no. 9, May 1, 1924, pp. 52-55, 5 figs. See also Compressed Air Mag., vol. 29, no. 8, Aug. 1924, pp. 965-968. Details of two hoists built for use in Porcupine mining districts; double-drum type; controlled by compressed air; 250-hp. motor used in each case; liquid rheostat found most suitable.

See also Electric.

Mine, Safety Devices for. Present Status of the Question of Safety Devices for Mine Hoists (L'état actuel de la question des parachutes de mines), Alex. Dupret. Annales des Mines de Belgique, vol. 25, no. 1, 1924, pp. 75-146, 12 figs. Extended study as to advisability of their adoption, including descriptions of various clamps and clutches, theory of operation, statistics regarding junctioning of devices; conclusions.

Planetary Gearing for. Planetary Gearing for Hoists (Umlaufräderwerke im Hebezeugbau), G. W. Heinold. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 46, Nov. 15, 1924, pp. 1191-1194, 12 figs. Describes two electric hoists in which the built-in planetary gearing finds varied use as transmission gearing, compensator, as substitute for coupling, and for control; advantages for twin-chain grab operation.

Skip. Effective Skip Hoist Cuts Job Costs. Am. Contractor, vol. 45, no. 32, Aug. 9, 1924, pp. 25-26, 3 figs. Hoist is designed for elevation of form lumber, reinforcing rods, pipe, etc.

Twin-Rope Skip Hoist Works Well, A. Allen and H. F. Hebley. Coal Age, vol. 25, no. 26, June 26, 1924, pp. 935-940, 8 figs. Using two ropes of comparatively small diameter for hoisting coal skips containing eight to eleven tons of coal each in somewhat novel practice adopted at Thermal No. 4 mine of Donk Bros. Coal & Coke Co., Madison County, Ill.

HOOKS

Girder-Lifting. See GIRDERS, Hooks for lifting.

HOSIERY MILLS

Development. See INDUSTRIAL MANAGEMENT, Hosiery Plant.

HOSPITALS. See BUILDINGS, Hospital.

HOT-WATER SUPPLY

Heating Surface of Apparatus. Calculation of Heating Surfaces of Hot-Water Apparatus (Berechnung der Heizflächen der Warmwasserbereitungsapparate), K. Schubart. Gesundheits-Ingenieur, vol. 47, no. 29, July 19, 1924, pp. 311-313. Discusses empirical formulas for hot-water surface calculation, based on Rietschel's work.

HOTELS

Design. Architect and Engineer Unite in Design of Hotel, G. H. Lippert. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, p. 813. New Belmont Hotel at Madison, Wis., has concrete frame, cantilever footings and irregular column spacing; heavy loads of material piled on floors.

Electrification of. Modern Hotel Electrification, K. Parker. Elec. Wld., vol. 84, no. 9, Aug. 30, 1924, pp. 404-410, 15 figs. New Statler Hotel in Buffalo uses more than 2000 hp. in lighting and motor service. General design principles and typical installations of motors, cables, and signal systems.

Purchased Power. See ELECTRIC POWER, Hotel Supply.

HOUSES

Cement-Stucco Finishes. Cement-Stucco Finishes. Concrete & Constructional Eng., vol. 19, no. 1, Jan. 1924, pp. 38-49, 13 figs. Methods of treatment for different cement exterior finishes.

Concrete. Concrete Houses, Part and Present, D. Williams. Cement & Eng. News, vol. 36, no. 1, Jan. 1924, pp. 23-25 and 50, 8 figs. Brief history of progress of concrete houses to date.

Concrete-Brick. Temperature and Moisture Observations on a Concrete Hollow-Brick House (Temperatur- und Feuchtigkeitsbeobachtungen an einem Bau aus Betonhohlsteinen), A. Hummel. Beton u. Eisen, vol. 23, no. 4, Feb. 20, 1924, pp. 43-46, 6 figs. Results of observations carried out for duration of a year show that use of described concrete hollow-brick construction for dwelling houses meets atmospheric requirements of masonry structures with entire satisfaction.

Concrete Masonry. Concrete Masonry House Construction. Cement & Eng. News, vol. 36, no. 1, Jan. 1924, pp. 27-31, 8 figs. Has concrete block walls; standard unit a factor; standard wall sections; construction details of cinder block walls, floors, sills and lintels; and roofing.

Construction. Aspects of Houses in Relation to Wind, Rainfall and Sunshine, N. Lloyd. Roy. Inst. British Architects—Jl., vol. 31, no. 19, Sept. 20, 1924, pp. 633-644, 16 figs. Considers influences of wind, rainfall, and sunshine as affecting that front of a house which is often styled garden front, in which architect strives to place as many as possible of his living rooms and bedrooms. Tables and diagrams.

Pisé Construction. See BUILDING CONSTRUCTION, Pisé.

HOUSING

France. Cheap Housing (Les habitations à bon marché), P. Razous. Génie Civil, vol. 84, nos. 7 and 8, Feb. 16 and 23, pp. 156-159 and 179-183. Status of legislation and construction in France.

Industrial Villages. Bethlehem Park—An Industrial Village. Iron Age, vol. 113, no. 16, Apr. 17, 1924, pp. 1160-1161, 4 figs. 300 houses to be sold to employees on easy terms; attractive layout planned, with gardens, parked boulevard, and playground.

Industrial Village on Sound Basis. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 9-14, 14 figs. Developments of village established by Kinkora Works of John A. Roebling's Sons Co.; houses for employees only; providing activities outside mill; caring for workers' savings; community services.

Plan for Industrial Community of Alcoa, Tennessee, Rob. F. Ewald. Eng. News-Rec., vol. 92, no. 9, Feb. 28, 1924, pp. 364-367, 2 figs. Aluminum and lumber companies occupy central area, with low lands for park areas forming five breaks, seven main thoroughfares and whole street system adjusted to contours.

Miners' Dwellings. Kramer Mine Houses Its Stay-at-Home Employees, A. F. Brosky. Coal Age, vol. 26, no. 14, Oct. 2, 1924, pp. 463-467, 10 figs. Particulars of plans adopted by Northwestern Min. & Exchange Co. for building mining town at its new Kramer operation, Jefferson County, Pa. Only one employee in every four lives at mine; each man requires 4.4 rooms; two-story houses accommodate two men each at cost 32.5 per cent less than bungalow type.

North and South America. Recent Progress in Workmen's Housing in the Americas. Pan American Union—Bul., vol. 58, no. 2, Feb. 1924, pp. 114-160, 49 figs. Review of developments in countries of North, Central, and South America.

Post-War Problem in Europe. Housing as a Post-War Problem in Europe. Int. Labour Rev., vol. 10, no. 3, Sept. 1924, pp. 452-469. Steps taken in countries where shortage was most acute to control use made of existing dwellings; "rationing" of accommodation and its allocation to the homeless in Germany and Austria; housing schemes for revival of building; in spite of great efforts made, it cannot yet be said that post-war housing problem is near solution.

Switzerland. Dwelling Colonies of the Building Society of Federal Employees in Zurich (Die Wohnkolonien der Baugenossenschaft des eidgen. Personals in Zürich). Schweizerische Bauzeitung, vol. 84, nos. 22, 23, and 24, Nov. 29, Dec. 6, and 13, 1924, pp. 261-263, 276-278, and 288-289, 27 figs., partly on supp, plate and pp. 290-291. Describes layout, buildings, school and garden, rents, etc.

Zoning and. Views on Zoning and Housing. Nat. Mun. Rev., vol. 13, no. 5, May 1924, pp. 274-288. Contains following articles: What the Banker Thinks of Zoning, Geo. S. Edie; What One Realtor Thinks of Zoning, J. W. Cree, Jr.; Reducing the Cost of Housing by Eliminating Building Law Requirements, I. H. Woolson; Do We Need Rent Control Laws Permanently? Clara S. Taylor.

HUMIDITY

High, Physiological Reactions to. See HEALTH, Physiological Reactions to High Temperatures.

Measurement. See HYGROMETERS.

Recorder, Direct-Reading. See TELEPHONY, Atmospheric Conditions, Effect of.

HYDRAULIC ACCUMULATORS

Construction and Characteristics. Hydraulic Accumulators, H. S. Cattermole. Mech. Wld., vol. 75, no. 1938, Feb. 22, 1924, pp. 113-114. Characteristics and constructional details.

Design. Hydraulic-Accumulator Installation at the Hartmann Textile Mill at Munster (Alsace) [L'installation d'accumulation d'énergie hydraulique des Manufactures Hartmann, à Munster (Haut-Rhin)]. Génie Civil, vol. 84, no. 2, Jan. 12, 1924, pp. 29-32, 6 figs. Whole plant includes low-pressure hydroelectric station with head of 15 m., and accumulating station with its sets of Sulzer centrifugal pumps and installations for utilization of high pressure.

Switzerland. Examples of Hydraulic Accumulators and Pumps in Switzerland, Italy, and France (Exemples d'installations hydrauliques d'accumulation et de pompage, en Suisse, en Italie et en France). Génie Civil, vol. 84, no. 9, Mar. 1, 1924, pp. 208-210, 5 figs. Describes accumulator plants working principally with Sulzer centrifugal pumps, placed in operation during past few years.

HYDRAULIC CARTRIDGE. See BLASTING, Hydraulic Cartridge.

HYDRAULIC DRIVE

Future Applications. Hydraulic Power and Its Future Applications, F. H. Towler. Machy. (Lond.), vol. 25, no. 632, Nov. 6, 1924, pp. 174-175, 2 figs. Survey of modern practice in use and abuse of hydraulic power; extent and direction of developments.

Schneider. The Schneider Gear for the Drive of Machine Tools and Hoists (Das Schneider-Kapselgetriebe für den Antrieb von Werkzeugmaschinen und Hebezeugen), O. Keller. Schweizerische Bauzeitung, vol. 83, no. 9, Mar. 1, 1924, pp. 100-101, 8 figs. New hydraulic drive patented by H. Schneider, with which any fine adjustment of speed according to material and feed can be made without interfering with operation; advantages of gear, which is a hydraulic change and reversing gear, consisting of two valveless pumps.

HYDRAULIC MACHINERY

Glycerine, Use in. Study on the Use of Glycerine in Hydraulic Machinery (Etude sur l'emploi de la glycérine dans les appareils hydrauliques), F. Mercier. Revue Industrielle, vol. 54, no. 2177, Apr. 1924, pp. 52-57, 4 figs. Translation (in abstract) in Mech. Eng., vol. 46, no. 6, June 1924, p. 353. Study of properties of glycerine and its action on metals, based on experience of 30 years extending over more than 1200 apparatus; author concludes that hydraulic or hydropneumatic apparatus of any kind, making use of glycerine, should be constructed so that in no case glycerine can come in contact with surfaces of different metallic nature.

HYDRAULIC PRESSES

Ram Speed. Ram Speed of Hydraulic Presses, H. S. Cattermole. Mech. Wld., vol. 76, no. 1959, July 18, 1924, p. 37. Discusses required ram speed for given operation, shows relation between press and pump and press and accumulator, and makes calculations.

HYDRAULIC TURBINES

Acceptance Test. Proposal for Uniform Rules for Testing Water-Power Plants, G. Sundby. Engineering, vol. 118, no. 3056, July 25, 1924, pp. 145-147. Discusses diversity in specifications and guarantee tests, and various factors to be considered in formulation of standard tests. Abstract of paper read before World Power Conference.

Bearings and Vibration Conditions. Experience with Bearings and Vibration Conditions of Large Hydroelectric Units, J. Harisberger. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 428-429, 1 fig. Troubles experienced with hydraulic turbines installed at Snoqualmie Falls and White River power stations, and remedies applied.

Calculation. Blade Wheels Operating in a Free Stream (Im offenen Flüssigkeitsstrom arbeitende Flügelräder), E. Moeller. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 26, June 28, 1924, pp. 675-680, 6 figs. Analytical treatment of helical turbine theory for finite number of blades and its application.

Characteristic Curves. The Characteristic Equations of Reaction and Impulse Water Turbines, H. W. Coultas. World Power, vol. 1, no. 5, May 1924, pp. 292-296, 5 figs. Shows how quantities are related and how equations can be obtained for characteristic curves of turbines.

Checking Performance. Checking the Operation of Hydro-Electric Units, Ralph Brown. Power, vol. 59, no. 10, Mar. 4, 1924, pp. 361-363, 4 figs. Detecting lost motion in operating-cylinder mechanism; checking output of unit; causes of reduced capacity; scheduling work when unit is taken out of service for repairs.

Development. Modern Hydraulic Turbines and Cheaper Power, Johnstone-Taylor. Serial article in Power House, beginning Mar. 20 and ending Oct. 20, 1924, 23 figs. Development of modern hydraulic turbine. Mar. 20: Predicts manufacturing concerns of future will locate their plants, in absence of cheap hydroelectric power, in locations where water resources are available. Apr. 5: Types best adapted for high and low heads as well as for small and large units. May 20: Field of Pelton wheel. June 20: Electric practice of today demands governing mechanism capable of insuring close speed regulation. Aug. 5: Function of needle valve in governing Pelton wheel. Aug. 20: Method of protecting penstocks. Sept. 5: Utility of surge tank as a reservoir for sudden load. Sept. 20: Efficiency of hydro-

electric plants. Oct. 5: Factors essential in comparing different types. Oct. 20: High efficiency can only be obtained by operating engineers "humoring" the equipment.

Discharge Losses. Energy Losses of Hydraulic Turbines at Discharge (Energie perdue par les organes de décharge des turbines hydrauliques), J. Calame. Bulletin Technique de la Suisse Romande, vol. 50, nos. 16, 18, and 19, Aug. 2, 30, and Sept. 13, 1924, pp. 197-201, 228-232, and 237-241, 15 figs. Calculation of water losses due to frequent and extreme variation of load; compensating errors of evaluation of water losses; numerical calculation for various plants.

Double-Runner Horizontal. See Raanaasfoss Plant, Norway.

Draft Tubes. A Rational Form of Draft Tube for Water-Turbines, A. Melovich. Engineering, vol. 118, no. 3057, Aug. 1, 1924, p. 153, 2 figs. Discusses two different kinds of draft tubes at Queenston Power Station, Ont., used for comparison of efficiency, and shows that one draft tube does not fulfill conditions for full bore flow, rendering comparison invalid.

Comparative Tests on Experimental Draft-Tubes. Am. Soc. Civ. Engrs.—Proc., vol. 50, nos. 3, 4, and 5, Mar., Apr., and May, 1924, pp. 345-350, 508-525, and 646-652, 11 figs. Discussion of paper by C. M. Allen and I. A. Winter, published in Nov. 1923 issue of Proc.

Draft Tubes for Hydraulic Turbines, J. M. Dymond. Univ. of Toronto Eng. Soc.—Trans. & Year Book, Apr. 1924, pp. 63-81, 10 figs. Functions of draft tubes; past types of draft tubes, and present outstanding types; present-day tendencies; special devices. List of references.

See also Steel Draft-Tube Liners.

Efficiency Tests. Hydraulic Tubine Efficiency, F. Johnstone-Taylor. Power Plant. Eng., vol. 28, no. 8, Apr. 15, 1924, pp. 436-437, 3 figs. Describes method of conducting efficiency tests and gives test results.

Factory. The Control of Power Production, Chas. L. Hubbard. Factory, vol. 32, no. 6, June 1924, pp. 822-825 and 908, 20 figs. Hydraulic turbines as factory power source.

15,000-B.Hp. 15,000 H.P. Water Turbine for the Tata Hydro-Electric Supply Company. English Electric Jl., vol. 2, no. 6, Apr. 1924, pp. 285-293, 8 figs. Description of unit for extension of existing Khopoli Station of Tata Hydroelectric Supply Co., in India; head, 1655 ft.; output, 15,000 b.hp.; speed, 300 r.p.m. Brief reference to geographical situation of Tata power system.

Governor-Pump Operation. Power Supply for Governor Pumps, Ralph Brown. Power, vol. 59, no. 3, Jan. 15, 1924, pp. 92-93, 2 figs. Describes economical system of governor-pump operation.

Governors. Automatic Speed Regulator for Hydraulic Turbines (Regolatore automatico di velocita per turbine idrauliche). Industria, vol. 38, no. 17, Sept. 15, 1924, pp. 476-479, 4 figs. Design and operation of Parenti regulator.

Study of Speed Regulators of Hydraulic Turbines with Regard to Their Influence on Efficiency of Installations (Etude des régulateurs de vitesse des turbines hydrauliques au point de vue de leur influence sur le rendement global des installations), Cayère. Houille Blanche, vol. 23, no. 85-86, Jan.-Feb. 1924, pp. 10-18, 21 figs. Examines three distinct elements of problem: Rôle of governors in maximum distribution of load among the different stations; in maximum utilization of hydraulic energy in plants having no reserve; and in maximum utilization of energy of plants having hydraulic reserve supply.

High-Speed. Extra High-Speed Turbines of the Bell & Cie. Machine Factory, Kriens, Switzerland (Extra-Schnelläufer-Turbinen der A.-G. der Maschinenfabrik von Th. Bell & Cie., Kriens), F. Prásil. Schweizerische Bauzeitung, vol. 83, nos. 1, 2, 3, and 4, Jan. 5, 12, 19, and 26, 1924, pp. 1-5, 22-24, 31-35, and 39-41, 35 figs. Review of development of new design and its installation, and account of tests on models and on turbine constructed for central station in Berne.

High-Speed Hydraulic Turbines (Turbine hydraulique extra-rapide), F. Prasil. Revue Générale de l'Electricité, vol. 16, nos. 7 and 8, Aug. 16 and 23, 1924, pp. 274-280, and 311-321, 35 figs. Discusses tendencies in turbine construction and describes improvements made by Th. Bell & Co., Switzerland, in their type of high-speed turbines; details of tests carried out at Bell shops.

Hydroelectric Equipment. Recent Developments in Hydroelectric Equipment, Wm. W. White. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 519-524, 10 figs. Facts relating to recent developments in hydroelectric machinery, such as that installed at power house at Mitchell Dam, Alabama.

Ice Formation, Prevention of. Preventing Ice Formation on Water Turbines, R. S. Hyatt. Elec. World, vol. 83, no. 8, Feb. 23, 1924, p. 386, 1 fig. Describes what is said to be effective means of heating turbine and preventing adherence of ice.

Impulse. See ELECTRICAL EQUIPMENT, British Empire Exhibition.

Installation System. Hallinger System of Installing Francis Turbines with Horizontal Shafts (Francisturbinen mit liegender Welle nach der Einbauweise von Hallinger), C. Reindl. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 6, Feb. 9, 1924, pp. 119-123, 14 figs. Describes four power plants and two designs for double twin turbines, which are located in machinery house under sheet-metal cover and have high-suction head-water level; arrangement requires little space, is easily installed and controlled.

Installations, Japan. Modern Hydraulic-Turbine Installations in Japan (Neuere Wasserturbinenanlagen in Japan), J. Moser. Schweizerische Bauzeitung, vol. 83, no. 19, May 10, 1924, pp. 224-226, 4 figs. Details of turbines installed by Escher Wyss & Co.

Kaplan. Historical Note on the Kaplan Turbine, J. Kneidl. Engineering, vol. 118, no. 3057, Aug. 1, 1924, p. 183, 1 fig. World Power Conference paper describing new type of water turbine suitable for medium and low heads.

Test Results with Storek-Kaplan Turbines (Versuchsergebnisse von Storek-Kaplanturbinen), H. Mikyska. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 17, Apr. 26, 1924, pp. 416-418, 12 figs. Describes test apparatus and shows with aid of brake curves that Kaplan turbine follows Prof. Camerer's law for increasing size of turbines in certain cases; results of successful tests for elimination of cavitations.

Large, Construction of. Building Hydraulic Turbines of Unusual Size, E. T. Spidy. Am. Mach., vol. 60, no. 10, Mar. 6, 1924, pp. 345-349, 15 figs. Equipment and methods of Dominion Engineering Works near Montreal; layout plate exceptionally large; heavy machine tools of various kinds; taking portable machines to work; balancing rotating parts of great weight.

Large Installations. Two Modern Turbine Installations (Zwei modern Turbinenanlagen), R. Hofmann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 16, Apr. 19, 1924, pp. 397-400, 12 figs. 14,300-hp. Pelton turbines of the Amsteg hydroelectric plant of the Swiss Federal Ry., and large Francis high-speed turbines of Mauzac hydroelectric plant, France; details of governors, safety arrangements, etc.

Lawaczeck. Large Low Head Water Power Developments, F. Lawaczeck. Engineering, vol. 138,

no. 3064, Sept. 19, 1924, pp. 434-436, 7 figs. Details of design and construction of Lawaczeck turbine, and theory leading to its development. Comparison with Kaplan turbine. Gave an efficiency of 87 per cent when tested at Charlottenburg.

The Lawaczeck Turbine and Related Turbine Problems (Om Lawaczeckturbinen og dermed sammenhaengende turbinproblemer), O. Svala. Teknisk Ukeblad, vol. 71, nos. 38 and 39, Oct. 10 and 16, 1924, pp. 326-328 and 334-336, 13 figs. See also Teknisk Fidskrift, vol. 54, no. 16, Apr. 19, 1924, pp. 39-47 (Mekanik), 21 figs. Explains theory of this design, which enables water turbines with low head to operate at high speeds. Gives diagrams, line drawings, photographs and plans of complete power stations. Results of tests carried and comparison with other turbines.

Low Falls. Hydraulic Turbines for Low Falls, F. Johnstone-Taylor. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 5-7, 4 figs. Describes low-fall Francis turbine; new types of runner; the hydraucone; Banki turbine.

Lubrication. See LUBRICATION, Prime Movers.

Manufacture. Fabricating Hydroelectric Units, H. R. Simonds. Iron Trade Rev., vol. 74, no. 11, Mar. 13, 1924, pp. 732-735, 7 figs. Describes production of heavy castings and steel-plate sections for water-power machinery; new 70,000-hp. turbo-generator under construction by Allis-Chalmers Mfg. Co., Milwaukee.

Machining Massive Parts of the World's Largest Prime Movers, E. J. Armstrong. Mech. Eng., vol. 46, no. 5, May 1924, pp. 263-267, 9 figs. Methods used for machining large cast-steel casings for 70,000-hp. hydraulic turbines installed at Niagara Falls.

Modern Installations. Some 1923 Hydraulic Installations. Elec. News, vol. 33, no. 14, July 15, 1924, pp. 51-53, 5 figs. Hydraulic Power Committee of Nat. Elec. Light Assn. submits report showing types of apparatus installed in certain 1923 developments.

Pelton Wheels. Pelton Wheels Working at Variable Heads (Au sujet des turbines Pelton travaillant sous une hauteur de chute variable), M. deSparre. Académie des Sciences-Comptes rendus des Séances, vol. 178, no. 24, June 10, 1924, pp. 1942-1948. Mathematical determination of head H_0 serving as basis for calculation, so as to make variation of efficiency minimum when head varies between minimum H_1 and maximum H_2.

The Genesis of the Pelton Wheel, A. T. Parsons. Am. Mach., vol. 60, no. 2, Jan. 10, 1924, pp. 61-63, 7 figs. How forty-niner and his need for mining equipment developed machine business in San Francisco; modern methods of building large hydraulic turbines.

Units of Pelton Wheels Under Varying Conditions (Die Einheitsgrössen der Becherturbinen unter wechselnden Bedingungen), G. Karrass. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 35, Aug. 30, 1924, pp. 902-904, 9 figs. Discusses peripheral velocity, friction, hydraulic efficiency, torque, and specific r.p.m., and makes calculations.

Propeller-Type. Propeller-Type Turbines of the Hydroelectric Plant at Wynau, Switzerland. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 704-705, 2 figs. Describes use of high-speed propeller-type turbines and gives test data. Translated from Génie Civil, vol. 85, no. 7, Aug. 16.

The Propeller Turbine (Die Propellerturbine), Rob. Dubs. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 48, Nov. 29, 1924, pp. 1243-1246, 14 figs. Describes design of new type of turbine and special feature of this design; gives results of tests and points out its value for economic utilization of low-pressure water powers; developed by Escher, Wyss & Cie, Zürich, Switzerland.

Properties. Characteristics of Hydraulic Turbines with Constant Number of Revolutions and Very Variable Head (Die Eigenschaften der Wasserturbinen bei gleichbleibender Drehzahl und stark veränderlichem Gefälle), R. Dubs. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 34, Aug. 23, 1924, pp. 872-876, 10 figs. Shows, on basis of characteristic braking curves, how these curves may be used for determining properties and efficiency of turbine of constant revaluation and variable head; gives application of results of three braking tests.

Protective Racks. Construction and Upkeep of Racks for the Protection of Hydraulic Turbines (La construction et l'entretien des grilles pour la protection des turbines hydrauliques). Génie Civil, vol. 85, no. 11, Sept. 13, 1924, pp. 225-230, 5 figs. Details of various types of racks, and mechanical rakes for cleaning them, as installed at Wynau and Beznau, Switzerland, and Chevres, France.

Raanaasfoss Plant, Norway. Efficiency Tests of Raanassfoss Turbines, H. Thoresen. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 558-560, 6 figs. Methods of making efficiency tests on two 12,000-hp. double-runner horizontal-shaft hydraulic turbines operating under 40-ft. head; results of tests.

The Turbines at Raanaasfoss Power Station, Norway, H. Thoresen. Engineer, vol. 136, nos. 3551 and 3552, Jan. 18 and 25, 1924, pp. 60-63, and 86-88, 27 figs. partly on supp. plate. Determination of size of units and choice of type of turbine; description of turbines. Jan. 25: Efficiency tests and testing arangements; test results.

The Turbines of the Raanaasfoos Hydroelectric Plant in Norway (Die Turbinen der Raanaasfoss-Wasserkraftanlage, Norwegen), H. Thoresen. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 15, Apr. 12, 1924, pp. 368-376, 25 figs. Details of design of turbines constructed partly by Aktiebolaget Karlstads and partly by J. M. Voith; results of tests.

Turbines in Raanaasfoss Power Station, H. Thoresen. Power, vol. 59, no. 8, Feb. 19, 1924, pp. 278-281, 8 figs. Plant contains six double-runner horizontal-shaft 12,000-hp. turbines operating under head varying from 31 to 46 ft.; turbines are set in open flumes and two different European designs are used.

Racing. Protection of Hydraulic Turbines Against Racing (Protection contre l'emballement des turbines hydrauliques). Houille Blanche, vol. 23, nos. 89-90 and 91-92, May-June and July-Aug. 1924, pp. 65-70 and 111-114, 10 figs. Shows from existing installation efficiency of various protective devices against increase of velocity, and explains their field of application; describes independent and sure protective device against racing, as in steam turbines.

Reaction. The Hydraulic Reaction Turbine, H. B. Taylor, Engineering, vol. 118, no. 3054, July 11, 1924, pp. 71-73. Discusses recent improvements including (1) incorporation of turbine as integral part in power-house construction, (2) division of casing into number of radial sections separated by planes containing turbine axis, (3) adoption of propeller-type turbine of extremely high specific speed, and (4) transformation of draft tube, etc. Abstract of paper read before World Power Conference.

Runners, Design. Hydraulic Turbine Progress, F. J. Taylor. Elec. Times, vol. 65, no. 1703, June 5, 1924, pp. 659-661, 6 figs. Trend of runner design. Increased speeds with lighter runners and lower heads.

Runners, Pitting of. Pitting of Hydraulic-Turbine Runners. Power, vol. 60, no. 1, July 1, 1924,

pp. 31-33, 3 figs. Conclusion is drawn from experience of operating companies that chief factor governing pitting of water wheels is total draft head acting on runner. (Abstract.) Report of N. E. L. A. Hydraulic Power Committee.

Specific Speed. Specific Speed, Its Meaning and Use as Applied to Hydraulic Turbines, R. T. Livingston. Power, vol. 60, no. 23, Dec. 2, 1924, pp. 880-882, 7 figs. Specific speed as guide to classification of hydraulic turbines; effects of change of load and head on specific speed; why high-specific-speed turbines are used on low heads and low-specific-speed runners are used on high heads.

Spiral. Large Spiral Turbines for Omine Hydroelectric Plant in Japan (Grosse Spiralturbinen für das Kraftwerk Omine in Japan), v. Troeltsch. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 15, Apr. 12, 1924, pp. 377-378, 3 figs. Describes spiral turbines with vertical shaft built by J. M. Voith, Heidenheim, Germany.

Steel Draft-Tube Liners. Steel Draft-Tube Liners for Turbines, E. A. Crellin. Elec. Wld., vol. 84, no. 22, Nov. 29, 1924, pp. 1161-1162, 1 fig. 30 per cent saving effected as compared with cost of wood forms; lined tube presents better wearing surface.

Storek-Kaplan. Tests on Storek-Kaplan Hydraulic Turbines, H. Mikyska. Mech. Eng., vol. 46, no. 7, July 1924, pp. 420-421, 3 figs. Tests carried out on turbines of various sizes by firm of Ignaz Storek, licensees for Kaplan turbine.

See also Kaplan.

Switzerland. Some Notable Modern Turbine Installations (Quelques installations remarquables de turbines modernes), R. Hoffmann. Bulletin technique de la Suisse Romande, vol. 50, no. 17, Aug. 16, 1924, pp. 209-214, 7 figs. Details of propeller turbines of Wynan hydroelectric plant, and tests carried out showing their advantages.

Testing. See Efficiency Tests.

Types. Hydraulic Turbines at the Gothenburg Exhibition in 1923 (Die Wasserturbinen auf der Jubiläumsausstellung in Gothenburg 1923), H. Munding. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 15, Apr. 12, 1924, pp. 359-366, 31 figs. Data on structural details and efficiency of Kaplan, Lawaczeck, and Francis turbines, governors with involute pendulum and auxiliary air chamber.

Voith. Progress in Turbine Construction Since the World War (Fortschritte im Turbinenbau nach dem Weltkriege), C. Schmitthenner. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 15, Apr. 12, 1924, pp. 349-358, 31 figs. Describes Voith turbines for small and medium-size heads, including Francis turbines with vertical and with horizontal shafts, and impeller or Kaplan turbines.

HYDRAULICS

Engineering Problems. Practical Hydraulic Engineering Problems, O.C.A. van Lidth de Jeude. Engineer, vol. 137, nos. 3558 and 3560, Mar. 7, and 21, 1924, pp. 260 and 308. Abstracts from lectures delivered before Instn. Civ. Engrs. on brushwood constructions; river improvements in the Netherlands; and harbor engineering abroad.

Experimental River. See RIVERS, Experimental.

Flow Obstruction in Open Channels. The Design of Works on Open Channels, F. V. Elsden. Engineer, vol. 137, no. 3565, Apr. 25, 1924, pp. 440-442, 8 figs. Deals with conservation of head in open channels; application of Bernouilli's theorem to reduce cost of works on open channels; design of inverted siphons, bridges and bridge piers, alignment of piers, shape of abutments, recovery of head, etc.

Flow of Water. See FLOW OF WATER.

HYDROCARBONS

[See also GASOLINE; KEROSENE; PARAFFIN; PETROLEUM.]

Analysis. Combustion of Petroleum Hydrocarbons, C. F. Mabery. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 911-912, 1 fig. Describes apparatus which eliminates sources of error in present method of hydrocarbon analysis.

Aromatic. Aromatic Hydrocarbons in Burmah Petroleums, H. M. Mulany and E. R. Watson. Chem. & Industry, vol. 43, no. 42, Oct. 17, 1924, pp. 310T-313T. Research undertaken in order to identify more important aromatic hydrocarbons in gasoline and kerosene fractions of Burmah oil; gives main constituents of these hydrocarbons.

Catalytic Decomposition of Naphthenes as a Method of Preparation of Aromatic Hydrocarbons, A. Vinogradov. Petroleum & Oil-Shale Industry, vol. 5, no. 10, Oct. 1923, pp. 484-488. Shows that it is possible to apply dehydrogenation in presence of catalyzers to technical preparation of aromatic hydrocarbons from petroleum. (In Russian, with brief abstract in English.)

Coal Conversion Into. The Conversion of Coal Into Oils, F. Fischer. Colliery Guardian, vol. 128, no. 3315, July 11, 1924, pp. 87-88, 4 figs. See also Iron & Coal Trades Rev., vol. 109, no. 2941, July 11, 1924, p. 57. Only certain constituents of coal can be converted into oils by means of destructive distillation there; theoretically, it is possible entirely to convert coal into hydrocarbons by means of hydrogenation; practically, however, attempts that have been made show that coal is only partly liquefied, rest becoming soluble only; third possibility for conversion of coal into oils is provided by synthesis from gases.

Electrochemical Oxidation. Electrochemical Oxidation of Aromatic Hydrocarbons, F. Fichter. Am. Electrochem. Soc.—Advance paper for meeting Apr. 24-26, 1924, no. 6, pp. 75-95. Carefully studied results of various methods of securing some degree of control of oxidation of organic bodies at anode. Discusses various electrolytes, carriers and effect of different anodes, and different current densities. Conception of anodic reactions is presented.

Gases. Prospects for the Use of Oil Gases for Chemical Purposes, A. F. Dobrianskij. Petroleum & Oil-Shale Industry, vol. 5, no. 9, Sept. 1923, pp. 258-276. Review of foreign patent literature dealing with questions of chemical use of hydrocarbon gases; author considers applicability and advantages of petroleum gas as source of alcohol, glycerol, glycols and acids. (In Russian.)

Iodine Action on. Action of Iodine on Hydrocarbons (De inwerking van jodium op koolwaterstoffen), F. J. Nellensteyn. Chemisch Weekblad, vol. 21, no. 9, Mar. 1, 1924, pp. 103-106. Iodine acts on all hydrocarbons, sometimes in the cold, sometimes at higher temperatures; hydrogen iodide is evolved, with separation of carbon, both solid and in colloidal solution; explains in what ways action of iodine is analogous to that of oxygen.

Oxidation by Ozone. Oxidation of Saturated Hydrocarbons by Ozone (Die Oxydation gesättigter Kohlenwasserstoffe durch Ozon), R. Koetschau and W. Flemming. Zeit. für angewandte Chemie, vol. 37, no. 4, Jan. 24, 1924, pp. 42-44. Saturated cyclic hydrocarbons are attacked by ozone, as is shown by marked increase in their viscosity and refractive index; oxidation is far-reaching and is complicated by apparent partial rupture of ring structure, with liberation of CO_2.

HYDROCHLORIC ACID

Production. See CHLORINE, Hydrochloric Acid from.

Storage and Transport. The Storage and Transport of Hydrochloric Acid, D. M. Newitt. Chem.

Trade Jl., vol. 74, no. 1918, Feb. 22, 1924, pp. 217-219 and (discussion) 219-220. See also Chem. & Industry, vol. 43, no. 8, Feb. 22, 1924, pp. 186-194, 9 figs., and India-Rubber Jl., vol. 67, no. 14, Apr. 5, 1924, pp. 19-23, 7 figs. Use of glass carboys anomalous; limitations of ebonite-lined steel tanks; use of rubber-lined wooden vessels; comparative cost figures.

HYDRODYNAMICS

Application in Aeronautics. See AERONAUTICS, Hydrodynamics, Application in.

HYDROELECTRIC DEVELOPMENTS

[See also WATER POWER.]

Australia. Hume Reservoir for Hydro-Electric Development. Indus. Australian & Min. Standard, vol. 71, no. 1836, Feb. 14, 1924, pp. 242-244. Reports of investigations of possibility of utilizing Hume Reservoir (Australia) for hydroelectric development. Conclusion reached was that Hume Reservoir, with capacity as at present proposed, viz., 1,100,000 acre-ft. would have a potential value for development of hydroelectric power and that increasing of capacity of reservoir would add to that potential value.

Austria. How Far May Latest Developments in Steam Power Production Affect Development of Our Water Power? (Inwieweit können die neuesten Fortschritte in der Dampfkrafterzeugung den Ausbau unserer Wasserkräfte beeinflussen?), F. Brock. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 25/26, June 27, 1924, pp. 227-234, 13 figs. Discusses coal in sight and calorific values, steam generation and increasing pressures, hydroelectric developments, and draws comparison in favor of latter.

Statistical, Economic and Legislative Data on Hydroelectric Development in Austria (Statistisches, Wirtschaftliches und Gesetzliches über den Ausbau der österreichischen Wasserkräfte), K. Naehr. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 240-242. Fuel and energy consumption in Austria; water power as substitute; developments in recent years; most important enterprises; competition of steam power plants; legislative support for obtaining necessary investment capital.

The Status of Hydroelectric Development in Austria at the End of 1923 (Die Grosswasserkraftverwertung in Oesterreich nach dem Stande Ende Dezember 1923). Elektrotechnik u. Maschinenbau, vol. 42, no. 2, Jan. 13, 1924, pp. 20-23. Statistical data on hydroelectric plants completed and underconstruction, and their output.

Bavaria. Water Power Developments in Bavaria. World Power, vol. 1, no. 2, Feb. 1924, pp. 80-84. Data on power developments of rivers in Bavaria; principal hydroelectric stations; distribution; financial aspect; railway electrification.

Big Creek, California. Progress on the Big Creek Hydro-Electric Project, D. H. Redinger. Compressed Air Mag., vol. 28, no. 12, Dec. 1923, vol. 29, nos. 1, 3, 4, 9, and 10, Jan., Mar., Apr., Sept., and Oct. 1924, pp. 720-724, 747-750, 803-808, 837-842, 989-992, and 1013-1017, 76 figs. Outline of part of undertaking being pushed forward by Southern Cal. Edison Co.; details of work in connection with power houses nos. 1, 2, 3 and 8, Shaver Lake tunnel, dams, etc.

Canada. Hydro-Electric Progress in Canada, 1923. Can. Engr., vol. 46, no. 4, Jan. 22, 1924, pp. 177-178. Review of principal water power developments in Canada; works under construction or actively in prospect; about 255,000 hp. were added during year, bringing total installation to 3,228,000 hp.

Isle Maligne Hydro-Electric Development, J. P. Chapleau. Can. Engr., vol. 46, no. 19, May 6, 1924, pp. 487-489, 5 figs. Large power development being undertaken by Quebec Development Co., on Saguenay River at Isle Maligne station; 12 turbine units will be installed, having a total capacity of 540,000 hp.; details of turbine construction.

Power Developments on St. Maurice River, L. H. Burpee. Can. Engr., vol. 46, no. 22, May 27, 1924, pp. 553-556 and 570, 6 figs. Existing hydroelectric plants on St. Maurice river produce 450,000 hp.; new development at LaGabelle will increase this by 150,000 hp.; power-house construction details.

St. Margaret's Bay Hydro Development. Can. Engr., vol. 47, no. 27, Dec. 30, 1924, pp. 639-642, 6 figs. Nova Scotia Power Commission's first hydroelectric development; supplies Halifax with power; run-off and precipitation data; drainage area of two rivers utilized; two power stations have total output of 10,800 hp.

The Generation of Hydro-Electric Power in Canada, H. G. Acres. Eng. Jl., vol. 7, no. 7, July 1924, pp. 383-420, 65 figs. Progress in Canadian practice in connection with hydraulic power development.

Two Units at World's Largest Power Centre Will Be Ready Next Month, D. Kennedy. Contract Rec., vol. 38, no. 52, Dec. 24, 1924, pp. 1260-1267, 12 figs. Detailed account of work accomplished to date on first of two hydroelectric schemes projected by Quebec Development Co., at Isle Maligne, for harnessing waters of Saguenay River. Total power for this plant 540,000 hp.

Water Power in the Northland. Contract Rec., vol. 38, no. 46, Nov. 12, 1924, pp. 1116-1121, 16 figs. Details of Quinze power development of Northern Can. Power Co.; ultimate capacity 60,000 hp.

See also Manitoba; New Brunswick; Ontario; Quebec.

Carolinas. The Catawba River Development. Elec. World, vol. 83, no. 24, June 14, 1924, pp. 1234-1236, 1 fig. How hydroelectric power is utilized in Carolina to supply large group of textile industries; operating conditions.

Centralization of. The Tendency Toward Centralization of Power Development, W. L. Abbott. Mun. & County Eng., vol. 66, no. 4, Apr. 1924, pp. 165-171, 2 figs. What various states are doing; consolidation of stations; rail transmission of power cheaper than wire transmission; how railway coal freight schedules are made up; etc.

Ceylon. Hydro-Electric Developments in Ceylon. Elec. Times, vol. 65, no. 1706, June 26, 1924, pp. 767-768, 2 figs. Describes general particulars as to factors influencing development of waterpower in Ceylon; proposed scheme of developments which relates to utilization of water of Aberdeen Catchment area dammed up on river Kahelgamu-oya at Glencairn and from Laxapana Catchment area dammed up on river Maskeilya-oya at Kintyre.

The Aberdeen-Laxapana Hydroelectric Scheme, Ceylon. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 473-475, 5 figs. Scheme provides for intake dam and regulating reservoir of 30 million-gal. capacity at Norton Bridge, involving structure about 90 ft. high provided with spillway; pressure tunnel from intake will be 8100 ft. in length and 63 sq. ft. sectional area.

Davis Bridge Project, Vermont. Davis Bridge Power Project to Develop 60,000 Hp., A. C. Eaton. Eng. News-Rec., vol. 92, no. 4, Jan. 24, 1924, pp. 142-146, 8 figs. New England power-system unit to produce 390,000,000 kw-hr. annually on Deerfield River; in 70 mi. 1700 ft. of head are to be utilized; major unit is 200-ft. earth dam, highest on record.

Davis Bridge Development of the New England Power Company. Power, vol. 59, no. 20, May 13, 1924, pp. 776-779, 8 figs. Project on Deerfield River involves earth dam 200 ft. high, storage reservoir of 50,000,000,000 cu. ft. capacity, 13,000-ft. tunnel and three 20,000-hp. units for head varying from 300 to 390 ft.

Economics of. The Economics of Hydro-Electric Development, D. W. Mead. Am. Soc. Civ. Engrs. —Proc., vol. 5, no. 4, Apr. 1924, pp. 417-452, 9 figs. Discusses following factors: Acquisition of suitable legal rights; command of satisfactory power market; suitable physical and hydrological conditions; proper design of works involved; economical construction and financing; rapid and economical development of business; management, operation and maintenance; accurate estimates; factors of economic expediency in consideration of proposed hydroelectric developments; capital costs; annual expenses; calculation of net revenue.

Equipment Selection. Hydro-Electric Development With Special Reference to the Hydraulic Equipment, W. M. White. Boston Soc. Civ. Engrs. —Jl., vol. 11, no. 1, Jan. 1924, pp. 1-16 and (discussion) 16-20, 9 figs. Present general practice governing selection of machinery for various heads.

France. Putting Through a Great Hydro-Electric Project in France. Compressed Air Mag., vol. 29, no. 7, July 1924, pp. 919-922, 13 figs. Details of work in Ossau valley, Pyrenees, for supplying power for electrification of Midi Ry., including reservoir and tunnel work, power-house construction, and equipment.

Fundamental Problems. The Fundamental Problems of Hydroelectric Development, John R. Freeman. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 1-10 and (discussion) 10-12, and 39, 2 figs. Notes on change and progress; costs of hydro vs. steam; change of method in solving problems of development; interconnection of power systems; value of water-power site; centralizing vs. scattering industries; education in public relations. Discussion includes following contributions: Study of Hydro-electric Possibilities, J. P. Hogan; Water-Power Costs vs. Steam-Power Costs, Geo. A. Orrok; Interconnection of Power Systems, H. W. Buck.

Georgia. And Now Railway Super Power! Frank L. Butler. Elec. Traction, vol. 20, no. 6, June 1924, pp. 249-252, 6 figs. How Georgia Railway & Power Co. systematically operates its great hydroelectric plants and participates in immense superpower development of Southeast.

Holtwood, Pa. Fifteen Years' Progress in Water-Power Development at Holtwood. Power, vol. 60, no. 14, Sept. 30, 1924, pp. 522-527, 10 figs. Plant of Pennsylvania Water & Power Co., at Holtwood, Pa., on Susquehanna River, first unit of which was put into operation in Oct. 1910, has recently been completed by installation of units 9 and 10, rated at 20,000 hp. under a head of 62 ft. and discharging into spreading draft tubes of special design with a scroll case at lower end similar to that for runner setting. Article based on three papers by N. B. Higgins and R. L. Thomas, F. H. Rogers, and J. W. May and K. D. MacLean, read at Joint meeting of Baltimore Sections of A.I.E.E. and A.S.M.E.

Improvements. Recent Advances in Hydro-Electric Engineering Practice, L. F. Harza. West. Soc. Engrs.—Jl., vol. 29, no. 9, Sept. 1924, pp. 339-349. Brief history of development of principal parts of hydroelectric stations, and advances that have been made in past 20 years; higher speeds, improved draft tubes, better control apparatus, and mechanical refinements are among improvements described.

India. Sutlej River Hydro-Electric Scheme, A. C. deL. Joly de Lotbinière. Roy. Engrs. Jl., vol. 38, no. 2, June 1924, pp. 267-270. Summary of preliminary survey report; available head, 328 ft.; 10 ft. pressure piping, 1.8 miles in length for turbines.

Interdependence of Irrigation and. The Interdependence of Irrigation and Hydroelectric Power, J. D. Galloway. Jl. of Elec., vol. 52, no. 10, May 15, 1924, pp. 351-354, 2 figs. Exposition of relation of these two factors in western development and of use of water for both purposes.

Ireland. The Liffey Power Scheme, R. N. Tweedy. Elec. Rev., vol. 94, nos. 2411 and 2422, Feb. 15 and 22, 1924, pp. 244-245 and 285-287, 2 figs. Discusses scheme developed by Buchi, of Zurich, for Dublin Corpn., which, it is claimed, may be accepted as basis of any scheme which involves complete control of Liffey River.

Italy. A Daring Engineering Feat Succeeds, C. Semenza. Explosives Engr., vol. 2, no. 5, May 1924, pp. 155-162, 14 figs. How Italian engineers solved unusual and difficult problem of connecting an outlet tunnel 65 ft. beneath surface of Lake Santa Croce.

The Italian Hydroelectric Industry, L. Dominian. Trade Information Bul. (Supp. to Commerce Reports), no. 238, June 2, 1924, 17 pp. Data on extent of use of electricity in the various districts of Italy, together with specific information on many of the important hydroelectric power systems of the country.

Manitoba, Can. Great Falls Hydro-Electric Development of the Manitoba Power Company. Power, vol. 59, no. 12, Mar. 18, 1924, pp. 436-442, 12 figs. Complete project will consist of dam nearly mile long and installation of six 28,000-hp. turbines to operate under 56-ft. head, and each will require 5200 cu. ft.-sec. of water at full load; turbines are of propeller type and are largest capacity of this type ever constructed; special features are incorporated in design of draft tubes and scroll cases.

N. E. L. A. Report. Many Developments in Hydroelectric Field. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 759-763, 6 figs. Report of Hydraulic Power Committee of Nat. Elec. Light Assn., giving features of equipment of new projects and problems of operation.

New Brunswick, Can. Musquash Hydro-Electric Development, F. B. Casey. Can. Engr., vol. 46, no. 15, Apr. 8, 1924, pp. 405-409, 7 figs. Development in New Brunswick on Musquash River; three Morgan Smith turbines and C. G. E. generators develop 11,000 hp. for transmission to St. John and surrounding district and Moncton.

N. Y. State Barge Canal. Power Developments in the Barge Canal. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 882-886, 8 figs. Two 8000-hp. water power plants now under construction. Power for lock operations supplied by 32 small plants.

New Zealand. Hydro-Electric Power Development in New Zealand. Elec. Engr., vol. 1, no. 4, July 15, 1924, pp. 123-128, 4 figs. Discusses topographical, historical, program of development, power board schemes under construction, schemes already in operation, electric power boards, etc.

Hydro-Electric Power Development in New Zealand. Elec. Rev., vol. 95, no. 2440, Aug. 29, 1924, pp. 314-316, 5 figs. Describes Mangahao station, one of three large water power sites in scheme submitted to New Zealand Government.

Newfoundland. Hydro-Electric Power Development in Newfoundland. Engineering, vol. 118, no. 3056, July 25, 1924, pp. 125-127, 15 figs. partly on supp. plates. Particulars of hydroelectric scheme being carried out in Humber River district of Newfoundland, where continuous output of 100,000 b.hp. will be utilized in paper mills of Newfoundland Power & Paper Co., Ltd., and for lighting and heating new township of Corner Brook. Work is being carried out by W. G. Armstrong, Whitworth & Co., Ltd., Lond., who

are also manufacturing turbines which will be installed at the site.

Newfoundland Water Power. Times Trade & Eng. Supp., vol. 14, no. 303, Apr. 26, 1924, p. 167, 3 figs. Progress being made in large scheme for production of hydroelectric power and manufacture of paper, known as Humberarm proposition, in western Newfoundland; details of dam, pipe line and power house, and paper mill.

Norway. To Build Three High-Head Power Plants in Norway, E. Svangöe. Eng. News-Rec., vol. 92, no. 3, Jan. 17, 1924, pp. 106-107, 2 figs. Heads up to 3000 ft.; stream flow to be supplemented by storage; many miles of tunnels.

Ontario, Can. Hydro Developments near Campbellford. Can. Engr., vol. 47, no. 18, Oct. 28, 1924, pp. 465-467, 5 figs. Data on power plants at dams No. 8 and No. 9, Trent Valley Canal System of Ontario Hydro-Electric Commission, which are nearing completion; automatic remote supervisory control an outstanding feature; three turbines at each plant.

Hydro-Electric Development for Gold and Silver Mines of Northern Ontario, A. R. Webster. Ontario Dept. Mines—Bul., no. 46, 1923, 23 pp., 20 figs. Describes installations of different power companies and gives amount of turbine capacity connected to generators owned by each, aggregating 64,490 hp.

Power Generation on the Kaministiquia River. Power House, vol. 17, no. 18, Sept. 20, 1924, pp. 19-20, 3 figs. Development at Kakabeka Falls, Ont., operating under 180-ft. head; main source of electricity supply for cities of Port Arthur and Fort William.

Queenston-Chippawa Development of the Hydro-Electric Power Commission of Ontario, F. A. Gaby. Engineering, vol. 118, nos. 3059 and 3060, Aug. 15 and 22, 1924, pp. 220-223 and 255-257, 23 figs. partly on supp. plates. Outline of a number of salient engineering and other features involved in design and construction of Queenston-Chippawa development. Deals with intake, canal, screen house, penstocks, generating and transformer station, turbines, Johnson valves, governers and generators.

Queenston-Chippawa Power Development, F. A. Gaby. Can. Engr., vol. 47, no. 6, Aug. 5, 1924, pp. 209-215, 6 figs. Outstanding features of Ontario Hydroelectric Power Commission's development; will ultimately have capacity of over 550,000 hp.

Power Rates. Power Rates in Hydro Development, Rob. F. Ewald. Elec. World, vol. 84, no. 19, Nov. 8, 1924, pp. 993-995, 1 fig. Economic limits of development of water power are fixed by maximum rates for various periods; computations by means of "energy drawn-down diagrams" explained.

Quebec, Can. Hydro-Electric Power Developments at Shawinigan Falls, Quebec. Power, vol. 59, no. 4, Jan. 22, 1924, pp. 120-124, 9 figs. Describes No. 1 and No. 2 power plants owned and operated by Shawinigan Power & Water Co.; latest addition to plant No. 2 is a 41,000-hp. unit of vertical-shaft arrangement; draft-tube construction; generator designed to operate at 75 per cent power factor.

St. Lawrence River. The Development of the St. Lawrence River for Power and Navigation. Engineering, vol. 118, nos. 3059 and 3060, Aug. 15 and 22, 1924, pp. 239-241 and 271-273, 9 figs. See also Can. Engr., vol. 47, nos. 8 and 9, Aug. 19 and 26, 1924, pp. 253-256 and 265, and 277-283, 11 figs. Considers characteristics of Upper St. Lawrence which have an important bearing on design, construction, and operation of development works. Methods of development. Estimates of cost.

San Francisco, Cal. San Francisco's Hetch Hetchy Water Supply and Power Development, M. M. O'Shaughnessy. Gen. Elec. Rev., vol. 27, no. 2, Feb. 1924, pp. 78-84, 10 figs. Describes development as a whole and explains San Francisco water situation; features of hydroelectric development; describes dam to be known as O'Shaughnessy Dam which, when completed, will be highest in world.

The Hetch Hetchy Water Supply and Power Project, C. W. Geiger. Nat. Engr., vol. 28, no. 3, Mar. 1924, pp. 95-99, 4 figs. Will supply, when completed, 400,000,000 gal. water daily to population of 4,000,000 people in San Francisco and other cities of metropolitan district, and will generate 200,000 hp.; describes O'Shaughnessy dam, and gives construction details of tunnel.

Sardinia. The Tirso Hydro-Electric Scheme. Elec. Rev., vol. 94, no. 2428, June 6, 1924, pp. 925-929, 8 figs. Describes dam, and power house and its equipment; equipped with two double turbines of 6000 b.hp. each, two double turbines of 9000 b.hp. each, and a small auxiliary turbine of 60 b.hp., which provides power for internal uses.

Scandinavia. Water Power in Scandinavia, F. Johnstone-Taylor. Elec. Times, vol. 65, no. 1691, Mar. 13, 1924, pp. 299-301, 7 figs. Brief outline of machinery of hydroelectric stations at Vamma, Herlandsfossen, Raanaafoss, and Nore Falls in Norway, and at Forshuvudforsen, Finspongs, and Untraverket in Sweden, which have been put into operation within last three or four years, to give idea of present-day hydraulic-turbine practice in Northern Europe.

Sicily. A Sicilian Hydro-Electric Installation, J. S. Barnes. Elev. Rev., vol. 94, no. 2411, Feb. 8, 1924, pp. 219-221, 8 figs. Details of Belice hydroelectric scheme near Palermo; main storage reservoir has total capacity of 32,800,000 cu. m., of which 21,000,000 cu. m. may be drawn upon; dam is 133 ft. high, 866 ft. long, and is dry-built of stone; pressure tunnel is 850 m. long; in engine room are four Pelton wheels each of 3500 b.hp. connected directly with four 3-phase alternators.

Skagit River, Washington. Skagit River Hydro-Electric Development, S. G. Roberts. Compressed Air Mag., vol. 29, no. 8, Aug. 1924, pp. 949-954, 18 figs. Project now delivers 55,000 hp. to Seattle and may ultimately produce more than half million hp. for whole of western Washington.

Status, 1923. Status of Hydro-Electric Construction. Elec. World, vol. 83, no. 1, Jan. 5, 1924, pp. 27-29, 1 fig. 29 projects now being constructed under licenses from Federal Power Commission. California leads in number and horsepower of projects now being developed.

Sweden. Swedish Water Power and the Farmer. Elec. World, vol. 83, no. 20, May 17, 1924, pp. 992-998, 14 figs. 40 per cent of tilled land now within reach of electric transmission lines; standardized distribution system employed, which is partly financed by farmers' local coöperative societies.

See also Scandinavia.

Switzerland. Hydroelectric Development and Railway Electrification in Switzerland (Reiseeindrücke über Wasserkraftnutzung und Bahnelektrisierung in der Schweiz), P. Dittes. Elektrotechnik u. Maschinenbau, vol. 42, no. 12, Mar. 23, 1924, pp. 177-189, 21 figs. Describes more important hydroelectric plants and developments in railway electrification, including transmission lines, locomotives, etc.

The Export of Electric Energy and the Development of Water Power in Switzerland (Ausfuhr elektrischer Energie und Ausbau der schweizerischen Wasserkräfte), W. Trüb and E. Stiner. Schweizerische Bauzeitung, vol. 83, no. 13, Mar.

29, 1924, pp. 149-155. Discussion before Zurich Soc. of Engrs. & Architects, dealing with power-plant construction, electricity supply within Switzerland, and export of electric energy.

Tasmania. A Few Notes on the Hydro-Electric Power of Tasmania, C. C. Halkyard. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 241-258, 9 figs. Water-power potentialities, application of power commercially, details of Waddamana power plant and main works, canals, pipe lines, transmission lines, substation, etc.

The Great Lake Hydro-Electric Scheme, Tasmania. Engineering, vol. 117, nos. 3038, 3041, 3044, 3045, 3048, and 3051, Mar. 21, Apr. 11, May 2, 9, 30 and June 20, 1924, pp. 355-357, 451-452 and 466, 568-570, 595, 694 and 704, and 792-793, 84 figs. partly on supp. plates. Describes recently completed extension for bringing continuous capacity of scheme up to 58,000 hp.; details of most important features, including reinforced-concrete flume, Ouse River diversion works, multiple-arch dam, substations, etc.

United States, 1923. Hydro-Electric Development Shows Unprecedented Activity. Power, vol. 59, no. 1, Jan. 1, 1924, pp. 12-16, 8 figs. Over 2,000,000 horsepower of new hydroelectric plants and extensions to old installations, in projects of 10,000 hp. and larger, were completed during 1923 or are now under construction in United States.

Waterways. Water Powers on Waterways (Wasserkräfte an Wasserstrassen), Gleichmann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 47, Nov. 22, 1924, pp. 1209-1213, 9 figs. General rules for construction and operation; relation between power and navigation requirements; weirs, installation of power plants, heads, velocity of flow; limiting the cost of construction and increasing output; Kaplan turbines of the Viereth and Kacklet power plants on the Main and Danube Rivers; economic considerations.

Western United States. Hydroelectric Practices and Equipment on the Pacific Coast, S. Barfoed. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 641-646, 1 fig. Physical features having deciding influence on design and construction of hydroelectric plants.

Survey Shows 1924 Will Be Record Year for Hydroelectric Development. Jl. Electricity, vol. 52, no. 3, Feb. 1, 1924, pp. 96-99, 5 figs., 1 map. Survey of hydroelectric projects under way during 1923 or definitely scheduled for 1924.

HYDROELECTRIC PLANTS

Alabama. Hydroelectric Practises and Equipment of the South, O. G. Thurlow and J. A. Sirnit. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 719-723, 8 figs. Discusses hydraulic power resources of South, design of Alabama Power Co.'s plants, Southern superpower system and advantages of linking up systems.

Assembling Hydraulic Units. Assembling Heavy Hydraulic Units in Plant at Bombay. Eng. News-Rec., vol. 92, no. 8, Feb. 21, 1924, pp. 328-329, 2 figs. Rotors and runners of six 10,000-kva. generating units shrunk on shafts with aid of only native labor.

Austria. The Mechanical and Electrical Equipment of the Partenstein Plant (Austria) (Die maschinellen und elektrischen Einrichtungen und die Stromwirtschaft des Werkes Partenstein), A. Kvetensky. Elektrotechnik u. Maschinenbau, vol. 42, no. 20, May 18, 1924, pp. 309-323, 10 figs. Description of Francis spiral turbines with vertical shaft and their control, generators, transformers, auxiliary machinery, measuring instruments, etc.; distribution system.

The Teigitsch Hydroelectric Plant of the Styrian Water-Power & Electricity Corpn., Austria (Das Teigitschkraftwerk der Steirischen Wasserkraft- und Elektrizitäts-A. G.), W. Hahn. Elektrotechnik u. Maschinenbau, vol. 42, no. 7, Feb. 17, 1924, pp. 89-94, 6 figs. Describes most important features of development, including dam, pressure conduits, reservoir, etc.; power-house equipment; includes three Francis spiral turbines to which generators are direct coupled.

Vienna Builds Remarkable Power Project on Ybbs River, O. Lemberger. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 494-496, 5 figs. Collapsible weir dam; six miles of tunnels, one siphon and two aqueducts in conduit; unusual type of surge basin; penstock carried on slide bearings, electrical current is transmitted to Vienna over 110,000-volt transmission line 84 mi. long, partly simple 3-phase and partly double 3-phase on steel towers.

Automatic. A 7,300-Kva. Automatic Hydro Station. Elec. World, vol. 83, no. 26, and vol. 84, no. 3, June 28 and July 19, 1924, pp. 1319-1322 and 111-114, 10 figs. Sprite Creek development of Adirondack Power & Light Co. is fully self-operating; design details and method of protection of largest automatic installation; hydroelectric features of development; design details of dam, gates, penstocks, and intakes; cost of station and hydroelectric works in graphic form.

Present Practise in the Auotmatic Operation of Hydroelectric Generating Stations, R. J. Wensley. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 508-513, 3 figs. Various methods of starting and controlling, together with their limitations; sequence of operations in modern automatic switching equipment.

British Columbia. Hydro-Electric Plant, Pacific Mills, Ltd., G. S. Barry. Can. Engr., vol. 46, no. 4, Jan. 22, 1924, pp. 161-162, 3 figs. New unit installed in pulp and paper mill at Ocean Falls, B. C., increases output to 15,000 hp.; consists of a 6300-hp. Pelton wheel direct-connected to a Can. Gen. Elec. generator with exciter.

Power Developments at Stave Falls. Contract Rec., vol. 38, nos. 39, 40, and 41, Sept. 24, Oct. 1 and 8, 1924, pp. 949-953, 979-983 and 999-1003, 34 figs. (partly in no. 42, Oct. 15, p. 1039). Extensive construction program carried out by British Columbia Elec. Ry. Co.; contracting features of important parts of work.

California. Big Creek-San Joaquin Hydroelectric Project, Claude C. Brown. Power Plant Eng., vol. 28, no. 3, Feb. 1, 1924, pp. 167-172, 14 figs. Big Creek No. 3 plant, known as The Electric Giant, has three turbine units and develops total capacity of 105-000 hp. under head of 760 ft.

Largest Hydroelectric Plant in the West Placed in Service. Eng. World, vol. 24, no. 1, Jan. 1924, pp. 19-21, 6 figs. Details of Big Creek No. 3 power plant.

Canada. Building a Hydro-Electric Plant on Saguenay River. Eng. News-Rec., vol. 93, nos. 16, 17, and 18, Oct. 16, 23, and 30, 1924, pp. 616-619, 662-665, and 702-705, 18 figs. Electrically driven construction equipment used entirely on 500,000-hp. operation in Northern Quebec; work lasts through three sub-arctic winters; 35-mi. service railway used. Oct. 16: Developing access and habitation. Oct. 23: Installing plant and power. Oct. 30: Construction progress and methods.

Building Canada's Hydro Electric Power Units, H. P. Armson. Can. Machy., vol. 32, no. 31, July 31, 1924, pp. 19-22, 5 figs. Outline of water-power development in Dominion with details of construction features of plant on Isle Maligne, and shop methods used in building some units at Canadian Allis-Chalmers Co's. Davenport plant in Toronto.

Generating Ontario's Cheapest Electric Power, A. Murphy. Power House, vol. 17, no. 16, Aug.

20, 1924, pp. 19-22, 5 figs. Describes Orillia power plant developing 6400 hp. on Severn River making possible power rate of $11.90 per hp. year per 10-hr. shift.

Unique Features in Island Falls Hydro-Electric Plant on the Abitibi River. Contract Rec., vol. 38, no. 45, Nov. 5, 1924, pp. 1094-1096, 7 figs. See also Elec. News, vol. 33, no. 22, Nov. 15, 1924, pp. 60-62, 7 figs. Ejector gate to compensate for loss of head in flood periods. Distributing cones are encased in cast iron. Reproduces photographs in connection with installation of turbine units which illustrate certain phases of design and construction quite new in hydroelectric field.

Unique Hydro-Electric Power Plant at Winnipeg, A. Murphy. Power House, vol. 17, no. 20, Oct. 20, 1924, pp. 66-68, 3 figs. Explains unique features of hydroelectric plant and central heating system about to be put into operation.

Chile. The Maitenes Hydroelectric Plant (Planta hidro-eléctrica de Maitenes), M. E. Herrera. Instituto de Ingenieros de Chile—Anales, vol. 24, no. 5, May 1924, pp. 291-312, 27 figs. Details of plant 13 km. from junction of Colorado and Maipo rivers, belonging to Chilean Electricity Co.; barrage work, pressure piping, sand catcher, storage basin; power house and equipment, including Pelton wheel of 11,300 hp. at 600 r.p.m. and Westinghouse 3-phase generator of 8125 kw.

Conduits. See CONDUITS.

Dams. See DAMS.

Danube River, Germany. The First Hydro-electric Plant on the Danube River (Das erste Donaukraftwerk), W. Vieser. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 11-12, Mar. 21, 1924, pp. 91-94, 6 figs. The Rhine-Main-Danube as waterway for hydroelectric development; canalization of Danube by means of dam at Kachlet near Passau; description of plant, locks, weir, and power house; status of construction work.

Davis Bridge Project, Vt. The Davis Bridge Power Plant Development of the New England Power Company, E. B. Collins and H. R. Wilson. Gen. Elec. Rev., vol. 27, no. 10, Oct. 1924, pp. 665-672, 11 figs. Located at Whitingham, Vt., and consists of two (ultimately three) 20,000-hp. hydroelectric units. Describes diversion tunnel and spillway, intake structure, pressure tunnel, turbines and generators, low-tension switching equipment, high-voltage equipment, transformers, etc.; is enabled to transmit at 66,000 and 110,000 volts simultaneously.

Design. Great Works Hydro-Electric Plant Has Original Design, R. J. Andrus. Elec. Wld., vol. 84, no. 7, Aug. 16, 1924, pp. 305-307, 7 figs. New automatic station constructed by combining dam, bridge, and building parts for triple use; development cost per kilowatt about $284.

Regulating Guaranties for Hydraulic Plants (Reguliergarantien für Wasserkraftanlagen), K. Lubowsky. Elektrotechnische Zeit., vol. 45, no. 39, Sept. 25, 1924, p. 1025. Discusses difficulties in design of plants to reconcile demand for reduction of moments of gyration (reduction of generator mass), with keeping low variation in voltage connected with load fluctuations.

France. Construction of Dam and Works of Chancy-Pougny (La construction de l'usine-barrage de Chancy-Pougny), L. Vennin. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 324-354, 24 figs. partly on supp. plate. Improvement works of Upper Rhône, barrage works at Chancy, water intake, plant equipment, including 9000-hp. turbines and 7000-kva. direct-coupled alternators.

Hydroelectric Generating Plant, at Chancy-Pougny (L'usine génératrice hydroélectrique de Chancy-Pougny), A. Tumerelle. Revue Générale de l'Électricité, vol. 16, no. 2, July 12, 1924, pp. 63-71, 12 figs. Details of design, construction, and equipment of plant of capacity of 35,000 kva. from five 7000-kva. alternators. Voltage of 11,000 raised to 120,000 for transmission to Ecuisses by double three-phase line.

The Chancy-Pougny Hydroelectric Plant on the Upper Rhône (L'usine hydro-électrique de Chancy-Pougny sur le Haut Rhône), C. Dantin. Génie Civil, vol. 85, no. 1, July 5, 1924, pp. 1-10, 13 figs. on supp. plate. Describes new hydroelectric plant at Swiss frontier, general layout, barrage arrangement, concrete work.

The Hydroelectric Plant at Eguzon (France) (L'Usine Hydro-électrique d'Eguzon), G. Laporte. Revue Industrielle, vol. 54, nos. 2174, 2176, 2178, and 2179, Jan., Mar., May, and June, 1924, pp. 447-456, 1-5, 102-105, and 129-141, 34 figs. Details of work under construction for exploitation of Eguzon waterfall; plant with five sets of generators of 12,500 hp. each, located at foot of dam 60 ft. high, feeds three groups of transformers connected to transmission lines of Paris-Orleans railway.

The Hydroelectric Plant of the Société Drac-Romanche at Pont-de-Claix on the Isère River (France) L'usine hydroélectrique Drac-Romanche), P. Dufour. Génie Civil, vol. 84, no. 1, Jan. 5, 1924, pp. 1-8, 17 figs. Development includes dam, 750-m. open canal, 1450-m. reinforced-concrete pressure conduit, 14,000-hp. power plant equipped with six sets of turbo-alternators, and 750-m. tail race; study of connection of conduit with plant.

Generator Sets. Generator Sets in Hydroelectric Plants of the Future (I gruppi generatori nelle centrali idroelettriche del domani), G. Belluzzo. Industria, vol. 38, no. 12, June 30, 1924, pp. 325-327, 1 fig. See also Elettrotecnica, vol. 11, no. 6, June 5, 1924, pp. 376-377, 1 fig. Discusses Francis turbines and proposes coupling them to alternators by means of reduction gears, showing advantages for large heads of water.

Germany. Construction of the Lake Walchensee Power Plant (Vom Bau des Walchenseekraftwerks), Ried. Beton u. Eisen, vol. 23, no. 17, Sept. 5, 1924, pp. 229-233, 14 figs. Details of reinforced-concrete construction work in connection with tunneling, barrage, pressure piping; use of torcrete process.

The East Prussia Works (Das Ostpreussenwerk), O. Jahnke. Elektrotechnische Zeit., vol. 45, no. 41, Oct. 9, 1924, pp. 1073-1076, 11 figs. partly on pp. 1077 and 1078. Particulars of Ostpreussenwerk A. G., supplying current to Province of East Prussia; layout and linking-up of works, description of Friedland works, dams, power house, transmission lines, etc.

Ice Troubles. Combating Ice in European Hydro-Electric Plant. Eng. News-Rec., vol. 93, no. 7, Aug. 14, 1924, pp. 265-266. Abstract of papers read by A. Frey and Arvid Ruths at First World Power Conference, Lond., dealing with methods employed in Norway and Sweden, chief sources of trouble, ice pressure, and effects of regulation. See also Eng. & Contracting (Water Works), vol. 62, no. 4, Oct. 8, 1924, pp. 805-809, and Engineering, vol. 118, no. 3054, July 11, 1924, pp. 73-74, for paper by A. Ruths.

Ice Problems at Hydro-Electric Plants, T. H. Hogg. Can. Engr., vol. 47, no. 20, Nov. 11, 1924, pp. 498-500. Discussion on outline of work of Committee on Ice Problems at Hydroelectric Plants at meeting of A. S. C. E. Formation of frazil and anchor ice and methods of preventing trouble.

Measures Taken in Sweden Against Ict Troubles at Water Power Plants, A. F. Samsioe. Engineering, vol. 138, no. 3065, Sept. 26, 1924, p. 463. Paper, abridged, contributed to World Power Conference.

Italy. The Corfino Hydro-Electric Scheme in Tuscany. Elec. Rev., vol. 95, no. 2435, July 25, 1924, pp. 143-145, 7 figs. Corfino plant forms part of enterprise of Società di Elettricita Ligure Toscana; details of design and construction of plant.

The Hydroelectric Plants of the Italian State Railways at Bardonecchia (Gli impianti idroelettrici di Bardonecchia delle Ferrovie dello Stato), G. Santi. Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 1, Jan. 15, 1924, pp. 1-19, 27 figs. partly on supp. plates. Particulars of high-head developments in Cottian Alps near Mont Cenis, power from which is to be employed for electric traction.

The Temu Plant of the Adamello General Electric Company in the Camonica Valley (L'impianto del Temù in Valle Camonica della Società Gen. Elettr. dell' Adamello). Elettrotecnica, vol. 11, nos. 29, 30, and 32, Oct. 15, 25, and Nov. 15, 1924, pp. 710-718, 746-752, and 898-900, 30 figs. Details of barrage dam, reservoirs, pressure piping, and machinery, including turbines, alternators, transformers and switchboard arrangements also additional machinery to be installed.

Japan. Modern Japanese Hydro Plant, S. Kinugawa. Elec. Wld., vol. 84, no. 10, Sept. 6, 1924, pp. 454-457, 8 figs. Description of Momoyama station of Daido Elec. Power Co., located on Kiso River. Details of construction, type of equipment used, and operating conditions.

On the Automatic Hydraulic Power Station, M. Fukuda and T. Sato. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 429, Apr. 1924, pp. 406-426, 15 figs. Construction details of No. 4 Kawakamigawa station, first automatic station in Japan. (In Japanese.)

Jim Falls, Wis. Completing the Jim Falls Hydro-Electric Development, A. J. Hammond. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 270-272, 6 figs. Time element a controlling feature; method of combating northern winter conditions; importance of careful preliminary studies.

Load Control. Load Control in Automatic Hydro-Electric Generating Stations, R. C. Denny. Power, vol. 59, no. 19, May 6, 1924, pp. 716-717, 3 figs. Float-control method of making load changes; load control where water storage is available.

Low-Head. Low-Head Hydroelectric Plants (Sur les groupes hydro-électriques de basses chutes,) M. Cayère. Société Française des Electriciens—Bul., vol. 4, no. 36, June 1924, pp. 547-558. Discusses difficulties in using fluctuating low heads of water and technical means to meet them.

Low Heads (Note sur l'aménagement des basses chutes d'eau), Ed. Maurein. Arts et Métiers, vol. 77, no. 49, Oct. 1924, pp. 378-382, 8 figs. Discusses types of arrangements for low-head utilization, and makes comparison with high-head arrangements.

Redevelopment Improves Output of Low-Head Power Sites, H. W. Taylor. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 754-756, 3 figs. Output, which was restricted by unregulated flow, was improved by combining head of two plants; installations based on flow studies; describes new power house on Housatonic River of Smith Paper Co., Lee, Mass.

Mexico. Waterpower Plant of the Alameda Hydroelectric Company (Wasserkraftanlage der Compañia Hidroeléctrica del Rio de la Alameda S. A., Mexico), A. Tracinski. Siemens-Zeit., vol. 4, nos. 8 and 9, Aug. and Sept. 1924, pp. 245-254 and 307-318, 32 figs. General plan and details of barrage work, pressure piping, turbines, generators, transformers, switching plant, El Oliver substation, etc., of plant supplying Mexico City.

Muscle Shoals. See CONCRETE CONSTRUCTION, Muscle Shoals, Power Development.

New York. The Backbone of a Water Power System. Oil Engine Power, vol. 11, no. 4, Apr. 1924, pp. 189-202, 10 figs. Particulars regarding equipment of Honk Falls, High Falls, and Eddyville plants of Honk Falls Power Co., situated on Rondout Creek, N. Y., particularly the Diesel oil engines; three plants generate alternating current which is fed into transmission lines at 33,000 volts.

New Zealand. The Mangahao Power Station. Elec. Times, vol. 65, no. 1706, June 26, 1924, pp 759-761, 5 figs. Further particulars of Mangahao power house. Capacity of plant is 24,000 kva.

Newfoundland. Newfoundland Water Power. Elec. Times, vol. 66, no. 1707, July 3, 1924, pp. 15-16, 5 figs. Details of Humber Arm scheme for power production mainly for "news" paper manufacture; 14-000-b.hp. water turbines, 6000-volt three-phase 50-cycle alternators, 6000- to 60,000-volt step-up three-phase transformers and 66,000-volt switchgear.

The Humberarm Hydro-electric Development in Newfoundland. Engineer, vol. 138, no. 3593, Nov. 7, 1924, pp. 514-517, 17 figs partly on p. 526. Scheme will provide a storage of 30,000,000,000 cu. ft. of water, representing theoretical effective horsepower of 113,000; details of arrangement of dam, intake, canals and pipe line, power house and equipment.

Norway. Hydroelectric Power Station Raanaasfoss (Turbinene ved Raanaasfoss kraftanlaeg), Thoresen. Teknisk Ukeblad, vol. 70, nos. 47 and 48, Nov. 23 and 30, 1923, pp. 402-405 and 414-417, 21 figs. Six turbines of 12,000 hp. each, made by Karlstads Mekaniska Verkstad, and J. M. Voith, Heidenheim.

Hydro-Electric Practice in Norway, H. A. Pulliam. Power, vol. 60, no. 13, Sept. 23, 1924, pp. 494-497, 3 figs. Construction and operating methods used in Norway.

Penstocks. See CONDUITS.

Reconstruction, Spiers Falls, N. Y. Redevelopment of Spiers Falls Hydro-Electric Project, C. Voetsch. Power, vol. 60, no. 25, Dec. 16, 1924, pp. 968-972, 8 figs. Plant on upper Hudson River of Adirondack Power & Light Corpn., which was laid out for ten 5000-hp. horizontal-shaft units, seven of which had been installed, is being rebuilt for 60-cycle service with modern-type 9000-hp. vertical-shaft machines to operate under 80-ft. head; construction problems involved in changing over setting intended for old units to meet conditions of new machines.

Sand-Removal Plants. The Deterioration of Turbines and Automatic Sand-Removal Plants Neues über Turbinen-Abnützungen und automatische Entsandungs-Anlagen), H. Dufour. Schweizerische Bauzeitung, vol. 83, nos. 15 and 17, Apr. 12 and 26, 1924, pp. 169-171, and 196-200, 16 figs. Cites examples to show that turbines, even in low-pressure works, suffer great deterioration from river detritus; and describes recent developments in automatic sand-removal plants.

Scheme of Arrangement. The Arrangement of Hydroelectric Plants of High and Medium Head (Quelques notes sur l'organisation des hautes et moyennes chutes d'eau), E. Maurein. Arts & Métiers, vol. 77, no. 43, Apr. 1924, pp. 126-135, 20 figs. Study of scheme of arrangement whereby

weir pond is eliminated and head race is replaced by supply tunnel driven in mountain.

Small. Small Water Powers. Power Engr., vol. 19, nos. 223 and 225, Oct., Nov., and Dec., 1924, pp. 369-372, and 429-432, and 458-461, 16 figs. Their commercial aspect, development, and modern equipment.

Spain. High-Voltage Power Supply in Spain. Elec. Rev., vol. 95, no. 2438, Aug. 15, 1924, pp. 253-255, 8 figs. Notes on Riegos y Fuerza del Ebro undertaking; equipment of various plants.

Plants of the Hydroelectric Company of Spain (Instalaciones de la Sociedad Hidroeléctrica Española), J. A. Cordon. Ingeniería y Construcción, vol. 2, nos. 22, 23 and 24, Oct., Nov. and Dec. 1924, pp. 433-440, 489-492, and 543-548, 30 figs. Details of plant and equipment at Salto del Molinar on Júcar river, supplying Madrid with power; 66,000-volt transmission for a distance of 254 km. Particulars of Villora power station, and Cortes de Pallás and Batanejo falls.

Salto de Durcal, Granada [Salto de Dúrcal (Granada)], T. Brioso. Revista de Obras Publicas, vol. 72, no. 12, June 15, 1924, pp. 229-230, 3 figs. Details of power house supplying current to Granada Ry., electric equipment, turbines and alternators, storage battery, etc.

Standard Tests. Standard Tests for Hydraulic Power Plants. Instn. Mech. Engrs.—Proc., no. 4, July 1924, pp. 567-587, 1 fig. See also Engineer, vol. 137, no. 3562, Apr. 4, 1924, pp. 354-356, 3 figs. Discussion on draft standard test code for hydraulic power plants drawn up by joint committee of Instn. Civ. Engrs. and Instn. Mech. Engrs.

Storage. Hydroelectric Storage Plants (Hydraulische Hochspeicherkraftwerke), A. Maas. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 45 and 46, Nov. 8 and 15, 1924, pp. 1161-1167 and 1195-1199, 29 figs. Discusses different storage possibilities; hydraulic storage plants; describes so-called high-pressure storage system, according to which water volumes from rivers or lakes, which are not used for power purposes, are lifted through pumping plants to natural or artificial basins, and from there are supplied to power plants when required; discusses four examples of hydroelectric storage plants.

The Influence of the Storage of Energy on Power Economics and Profitability of Hydroelectric Plants (Der Einfluss der Energiespeicherung auf die Energiewirtschaft und die Rentabilität von Wasserkraftanlagen), Rob. J. Novotny. Elektrotechnische Zeit., vol. 45, no. 43, Oct. 23, 1924, pp. 1138-1142, 8 figs. Power economics of hydroelectric plants with and without storage of energy; electric accumulators for storage of energy; water storage.

Switzerland. Illsee-Turtmann Power Plant (Die Illsee-Turtmann-Kraftwerke), J. Büchi. Schweizerische Bauzeitung, vol. 84, no. 24, Dec. 13, 1924, pp. 286-287, 5 figs. Describes plant using waters of Turtmann, Ill., and Meretschi rivers; present machinery equipment 20,000 hp.

Proposed Hydroelectric Plant on the Avançon River (Projet d'usine hydro-électrique sur l'Avançon), G. Nicole. Bul. Technique de la Suisse Romande, vol. 50, no. 21, Oct. 11, 1924, pp. 261-264, 5 figs. Describes general layout, barrage dams and reservoirs, pressure conduits, etc.

The Chancy-Pougny Works (Note sur l'usine de Chancy-Pougny). Bulletin Technique de la Suisse Romande, vol. 50, no. 15, July 19, 1924, pp. 185-190, 11 figs. Power house on Rhône on Franco-Swiss border, details of barrage dams and equipment including turbines.

The Lake Lungern Power Plant of the Central Swiss Power Works at Luzern (Das Lungernsee-Kraftwerk der Centralschweizerischen Kraftwerke, Luzern), V. Gelpke. Schweizerische Bauzeitung, vol. 84, nos. 21 and 22, Nov. 22 and 29, 1924, pp. 251-256 and 265-268, 25 figs. Details of water storage, pressure piping and line, and machinery equipment, including 12,000-hp. turbines, and Isodrom velocity control; turbine tests.

Viewpoints on Installation of Buildings with Wäggital Power Station as an Example (Gesichtspunkte zur Bauinstallation mit Beispielen von Bau des Kraftwerks Wäggital), A. Zwygart. Schweizerische Bauzeitung, vol. 84, nos. 7, 8, and 9, Aug. 16, 23, and 30, 1924, pp. 77-82, 99-101, and 110-111, 18 figs. Discusses working out of plans, calling for tenders, specifications, study of details, transportation of material to building site, accommodation for workers, supply of power, excavation work, concrete testing, etc.

Testing. See HYDRAULIC TURBINES, Acceptance Test.

Tidal-Power. See TIDAL POWER, Utilization.

Turbine-Driven Alternators, Load Division. Dividing Load Economically Among Turbine-Driven Alternators, J. D. McAdoo. Power, vol. 60, no. 15, Oct. 7, 1924, pp. 569-571, 2 figs. It is brought out that cost of power delivered depends on many factors besides that of unit capacity. A synchronous condenser, for instance, should not be loaded to full capacity with wattless current, regarding of reactive current carried by generators.

Water Measurement. Water Measurement and Its Relation to the Testing of Hydro Plants, F. Johnstone-Taylor. Elec. Times, vol. 66, no. 1707, July 3, 1924, pp. 5-7, 8 figs. Discusses efficiency of hydroelectric plants, especially turbines, and control of maintenance of efficiency by measuring quantity of water consumed by means of pitot tubes, current meters, weirs, and salt solution methods of which it gives details.

Water Supply. Regulating Flow of Water in Water Power Plants (Ueber die Regelung der Wasserführrung bei Wasserkraftanlagen), F. Kammerer. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 20, Oct. 31, 1924, pp. 184-186, 6 figs. Discusses economic arrangement of water supply and apparatus used for regulating; advantages of automatic weirs, and description of new type.

Winter Reconstruction. Winter Reconstruction at the Spier Falls (N. Y.) Power Plant, C. Voetsch. Eng. News-Rec., vol. 93, no. 20, Nov. 13, 1924, pp. 791-795, 6 figs. Old foundations adapted to suit larger units; unwatering part of tailrace is difficult problem; methods and results of winter concreting.

HYDROGEN

Active. Behavior of Active Hydrogen (Das Verhalten von aktivem Wasserstoff), K. F. Bonhoeffer. Zeit. für Physikalische Chemie, vol. 113, no. 3-4, Nov. 8, 1924, pp. 199-219, 1 fig. Active hydrogen produced in long vacuum tubes was found to reduce certain metallic oxides, halides and sulphides; active hydrogen was converted into molecular hydrogen by catalytic action of thin layers of metals or metallic oxides; catalytic activity of metal depends on its previous treatment and corresponds to its hydrogen overvoltage, that is, metals with high overvoltage are poor catalysts; results are best explained on assumption that active hydrogen is monatomic hydrogen.

Electrolytic Production. Electrolytic Production of Hydrogen and Oxygen (Der elektrolytische Wasserstofferzeuger Bauart Holmboe), M. Hanssen. Elektrotechnische Zeit., vol. 45, no. 19, May 8, 1924, pp. 462-463, 3 figs. New electrolytic gas generator, developed by C. F. Holmboe, of Norway, which shows marked improvements over

existing designs; plant with 400 of these cells has been in continuous operation since 1919 without having needed repairs of any kind; yearly average efficiency of 4.8 kw-hr. per cu. m. of hydrogen has been maintained; very high purity of generated gas obtained by use of distilled water in cells.

Notes on a New Hydrogen Cell. Chem. Age (Lond.), vol. 11, no. 264, July 5, 1924, p. 11, 1 fig. Details of Knowles patent column plant specially designed with view to economy in floor space, generating 7200 cu. ft. of hydrogen per hr. in less than one-third of usual area.

Industrial. Hydrogen in Industry (L'hydrogène dans l'Industrie), M. Verneuil. Vie Technique & Industrielle, vol. 5, nos. 58 and 59, July and Aug. 1924, pp. 221-226 and 297-303, 20 figs. Discusses chemistry of hydrogen, its manufacture, processes and apparatus used; decomposition of steam, catalysis, liquefaction, Claude apparatus, etc.

Ionization Potentials. The Ionization Potentials of Hydrogen as Interpreted by Positive Ray Analysis, T. R. Hogness and E. G. Lunn. Nat. Acad. Sciences—Proc., vol. 10, no. 9, Sept. 1924, pp. 308-405, 5 figs. Results of investigation.

Knowles Column Cells. The Knowles Column Cell. Chem. & Industry, vol. 43, no. 5, Feb. 1, 1924, pp. 119-120, 2 figs. Knowles column plant has electrodes of only moderate depth running at low-current density, and yet occupies only fraction of floor area required by any other make of plant.

Line Spectrum. Behavior of Line Spectrum of Hydrogen at Low Temperatures (Ueber das Verhalten des Viellinienspekturms des Wasserstoffs bei tiefen Temperaturen), L. Citron. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 470-476. Points out that many-line spectrum of hydrogen is interesting on account of possible inferences as to structure of molecule, and author examines it as produced partly in capillary, partly in positive column of Geissler tube when this was surrounded by liquid air.

Manufacture. Electrolytic Oxygen and Hydrogen. Elec. Rev., vol. 94, no. 2420, Apr. 11, 1924, pp. 572-573, 4 figs. Describes Knowles multipolar column cell, consisting of an electrolyte tank in which are suspended alternately anodes and cathodes, each covered by a gas-collecting bell.

Reversible Reactions. Reversible Reactions of Hydrogen and Carbon Monoxide On Iron Oxides (Étude des réactions reversibles de l'hydrogène et de l'oxyde de carbone sur les oxydes de fer), G. Chaudron. Revue de Métallurgie, vol. 21, no. 8, Aug. 1924, pp. 462-472, 10 figs. Experimental difficulties experienced by different investigators, and results of work done by author.

HYDROGEN-ION CONCENTRATION

Determination. Determination of Hydrogen Ions in Solutions (La détermination des ions hydrogène d'une solution), A. Travers. Chimie & Industrie, vol. 12, no. 2, Aug. 1924, pp. 212-232, 13 figs. Discusses methods for determining pH and their application to pure chemistry.

The Determination of Hydrogen-Ion Concentrations of Acid Solutions by Means of the Glass Electrode (Ueber die Bestimmung der Wasserstoffionenkonzentration saurer Lösungen mit Hilfe der Glaselektrode), A. L. v. Steiger. Zeit. für Elektrochemie, vol. 30, no. 6, June 1924, pp. 259-263. For determination of H-ion concentration of solutions of many organic liquids which, through disturbing factors, cannot be employed with either platinum-hydrogen electrode or with indicators, use is made of glass electrode which was first applied by Haber and Klemensiewics; describes method employed; as a rule results obtained can be reproduced to within about 0.0015 volt; investigation of influence of subjecting glass to treatment by various reagents.

HYDROGEN SULPHIDE

Absorption. Absorption of Hydrogen Sulfide, F. W. Sperr, Jr. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1237-1239, 2 figs. Describes process; secondary reactions; tower packing; efficiency of process.

HYDROGENATION

Kinetics of. Kinetics of Hydrogenation, E. J. Lush. Chem. & Industry, vol. 43, no. 11, Mar. 14, 1924, pp. 53T-56T, 4 figs. Measurement of effect of pressure on rate of hydrogenation by determining hydrogen absorbed in given time at various pressures.

Oils. See OILS, Hydrogenation.

HYDROGRAPHY

International Hydrographic Bureau. The International Hydrographic Bureau, Geo. E. Brandt. U. S. Nav. Inst.—Proc., vol. 50, no. 260, Oct. 1924, pp. 1658-1664. Its character, organization, and scope.

HYDROMETERS

Total-Immersion. A Total-Immersion Indicating Hydrometer, A. Pollard. Jl. of Sci. Instruments, vol. 1, nos. 4 and 5, Jan. and Feb. 1924, pp. 97-104 and 129-136, 7 figs. Describes a totally immersed constant weight hydrometer constructed from glass, which indicates density of liquids, and develops its theory.

HYDROPLANES

Lioré-Olivier. See AIRPLANES, Lioré-Olivier.

HYGIENE

[See HEALTH.]

Industrial Accidents and. See ACCIDENTS, Industrial.

HYGROMETERS

Types. Humidity and Its Measurement. Sci. & Art of Min., vol. 34, nos. 22 and 23, May 24 and June 7, 1924, pp. 342-343 and 358-359, 2 figs. Deals with chemical and physical hygrometers of different types.

Hygrometers (Die Feuchtigkeitsmessgeräte), K. Holzhausen. Feuerungstechnik, vol. 12, no. 17, June 1, 1924, pp. 141-144, 10 figs. Describes instruments with empirical calibration; by psychrometric method according to August; for air only, and for air and gases with sensible heat and impurities.

HYSTERESIS

Glow-Discharge Characteristics. The Hysteresis of Glow-Discharge Characteristics (Ueber die Hysteresis der Glimmentladungscharakteristik), R. Seeliger. Jahrbuch der Radioaktivität u. Elektronik, vol. 20, no. 4, Mar. 18, 1924, pp. 353-397, 18 figs. Possible causes of hysteresis: temperature effects, change of gas contents; change of electrodes; free charges; method of experimental investigation; observations on negative hysteresis; impurities and hysteresis; observations on positive hysteresis; review of literature bearing on subject.

Magnetic. Asymmetric Cycles of Magnetic Hysterisis in a Field of Constant Direction (Sui cicli asimmetrici di isteresi magnetica in un campo di direzione costante), M. Paris. Elettrotecnica, vol. 11, no. 16, June 5, 1924, pp. 370-376, 12 figs. Discusses ballistic and other methods of measuring and shows that losses are greater in asymmetric cycles than in symmetric cycles.

I

ICE HOUSES

Construction and Insulation. Construction and Insulation of Ice Storage Houses, A. B. Alexander. Ice & Refrigeration, vol. 67, no. 6, Dec. 1924, pp. 395-397. Points out many important features of construction and states that in many cases meltage of ice is erroneously attributed to poor insulation.

Lawrence, Kan. A Modern Ice Storage House, R. C. Rankin. Ice & Refrigeration, vol. 66, no. 3, Mar. 1924, pp. 241-242, 4 figs. Description of modern reinforced-concrete ice-storage house erected by Griffin Ice Co., Lawrence, Kan.; method of placing reinforcement and pouring concrete; method of applying insulation and insulation finish.

ICE MANUFACTURE

Costs. The Cost of Ice Production. Cold Storage, vol. 27, no. 320, Nov. 20, 1924, pp. 459-461, 1 fig. An investigation of manufacturing expenses. Actual working figures that give British ice makers an all-round costing basis.

Cracked- and Checked-Ice Problems. Solving "Cracked and Checked" Ice Problems, E. Ormsby. Power House, vol. 17, no. 7, Apr. 5, 1924, pp. 28-29 and 41, 3 figs. See also Southern Engr., vol. 41, no. 2, Apr. 1924, pp. 50-52. Outline of some remedies for difficulties confronting power plant engineers as a result of strains produced in freezing.

ICE PLANTS

Australia. Ice-Making and Cold-Storage Plants in Australia and New Zealand. Trade Information Bul. (Supp. to Commerce Repts.), no. 280, Oct. 1924, 33 pp. Particulars of plants, based on replies to questionnaire received from American consular officers.

Birmingham, Ala. Standard Ice Company's New Plant. South Engr., vol. 41, no. 7, Sept. 1924, pp. 44-46, 5 figs. Describes ice plant of Standard Ice Co., Birmingham, Ala., and gives principal equipment.

Charleston, W. Va. Performance of a Modern Ice Plant, C. P. Goree, Jr. Refrig. Wld., vol. 59, no. 5, Apr. 1924, pp. 16-20, 7 figs. See also South. Engr., vol. 41, no. 7, Sept. 1924, pp. 35-39, 5 figs. 100-ton ice-making plant of Diamond Ice & Coal Co., Charleston, W. Va.; complete operating results for June, 1923.

Compound-Ammonia-Compressor. A Compound Ammonia Compressor Ice Plant. South. Engr., vol. 41, no. 7, Sept. 1924, pp. 58-60, 7 figs. Two 30-ton compound compressors, motor driven, are main units of plant; electric energy is purchased and water for ice making is obtained from deep well.

Design. The Essentials of the Modern Ice Plant, C. T. Baker. Ice & Refrigeration, vol. 66, no. 3, Mar. 1924, pp. 243-245. Type of plant, prime mover, compressors, freezing tank, air agitation system, condensers and piping.

Developments. Forty Years Development in Ice and Refrigerating Plants, H. P. Hill. Nat. Engr., vol. 28, no. 10, Oct. 1924, pp. 479-485, 4 figs. Early history of refrigeration and description of early types of machines; recent progress.

Developments in Ice-Making Plants, H. P. Hill. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1015-1016. Outline of present practice and probable development.

Distilled-Water. Ice Plant Installs Unaflow Engines. Power, vol. 59, no. 25, June 17, 1924, pp. 981-982, 4 figs. Plant at Memphis, Tenn., economizes by purchasing governmental excess machinery; how water is treated; ice-storage facilities.

Electric Drive. The Application of Electric Energy to the Modern Ice Making and Refrigerating Plant, P. Schlingman. Refrig. Eng., vol. 11, no. 5, Nov. 1924, pp. 165-172, 3 figs. Comparison of motor-driven, uniflow-steam-engine-driven, and oil-engine-driven plants, giving production costs, showing that first is most desirable. Inducements made to ice plants by power companies as to service rates. Factors in selection of prime mover for an electrically driven plant.

Equipment. Essentials of a Modern Ice Plant, C. T. Baker. Refrigeration, vol. 34, no. 2, Feb. 1924, pp. 43-47. What modern plant should consist of as regards machinery and equipment.

Essential Factors in. The Modern Ice Plant, C. T. Baker. Refrig. Wld., vol. 59, no. 3, Mar. 1924, pp. 17-19. Essential factors to be considered in building a plant.

Freezing Tanks. Ice Freezing Tank Design, C. Wilkie. Ice & Refrigeration, vol. 67, no. 1, July 1924, pp. 50-55, 13 figs. Points out ways whereby installation of freezing tanks can be safeguarded against errors; influence of harvesting equipment.

Fuels and Prime Movers. Fuels and Prime Movers for Ice Plants, J. P. Greenwood. Ice & Refrigeration, vol. 67, no. 6, Dec. 1924, pp. 389-391, 3 figs. Conditions surrounding plants already built and in operation; presents chart whereby it is easy to tell which fuel is cheaper to use.

Huntingdon, Pa. Modern Ice Making and Icing Station at Huntingdon, Pa. Ice & Refrigeration, vol. 66, no. 4, Apr. 1924, pp. 283-290, 15 figs. Describes ice-making plant and car-icing station of Bolye Ice Co., recently completed; built for supplying ice for Fruit Growers' Express and Pennsylvania R. R. Co.

Improvements. Improvement In Ice Plants, R. C. Doremus. Refrig. World, vol. 59, no. 1, Jan. 1924, pp. 17-20. See also Ice & Refrigeration, vol. 66, no. 1, Jan. 1924, pp. 35-39 and Universal Engr., vol. 39, no. 2, Feb. 1924, pp. 23-28. Deals with water treatment, air treatment, ice making system, harvesting equipment, condensers, water heating, electric drive, ice storage, etc.

Iron and Steel. Periods of Recovery, Temperature, Grain Size, and Force Lines in Repeated-Impact Tests (Erholungspausen, Temperatur, Korngrösse und Kraftwirkungslinien bei der Dauerschlagprobe), E. H. Schulz and W. Prüngel. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Werkstoffausschuss), no. 40, Apr. 4, 1924, 7 pp., 12 figs. Shows that periods of recovery of one or more days result in decided increase of final number of blows. Mild steel and wrought iron show a maximum at 175 deg.

Mexico, Central America, and West Indies. Ice-Making and Cold-Storage Plants in Mexico, Central America and West Indies. Trade Information Bul. (Supp. to Commerce Reports), no. 229, May 19, 1924, 66 pp. Information based on replies received from American consular officers throughout world in answer to questionnaires calling for particulars of ice-making and refrigerating installations in their districts.

New York, N. Y. Mammoth Ice Plant Adopts New Methods, V. H. Vandiver and A. S. Taylor. Compressed Air Mag., vol. 29, no. 5, May 1924, pp. 851-856, 18 figs. Describes plant and equipment of Arctic Hygeia Ice Mfg. Co., New York

City; 1000 tons ice per day capacity; electric drive and raw-water system replace steam drive and distilled-water system.

Oil-Engine-Driven. Economy from Oil Engine Power at the Coal Pit's Mouth. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 363-365, 5 figs. Operating at mouth of coal mine and driving Marion County Coal Co.'s, Centralia, Ill., own machinery, three oil engines have been able to produce substantial savings over and above cost of coal-generated power in production of ice and refrigeration.

Ice Plant Changes to Oil Engine Drive. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 910-912, 5 figs. How Pure Water Ice Co. at Waukegan, Ill., reduced operating costs so it readily competes with natural-ice producers.

Ice Plants and the Question of Oil Engine Power, C. T. Baker. Oil Engine Power, vol. 11, no. 4, Apr. 1924, pp. 212 and 217-219, 2 figs. Deals with subject of oil-engine drive for ice plants, discussing cost of installation, maintenance and repair costs, fuel and lubricating costs, method of drive, etc. Extracts from paper read before Ga. Ice Assn.

Oil Engine as a Prime Mover in the Ice Plant, C. T. Baker. Ice & Refrigeration, vol. 66, no. 5, May 1924, pp. 467-469. See also Refrig. Wld., vol. 59, no. 5, Apr. 1924, pp. 13-15. Discusses various features of primary interests to business man, including dependability, maintenance costs, different methods of drive, kind of fuel, etc.

See also Raw-Water.

Operating System. Two Years in an Ice Plant, B. L. Gregory. South. Engr., vol. 41, no. 7, Sept. 1924, pp. 47-52, 7 figs. Gives experiences of engineer in ice plant and what was done to put plant in proper operating condition.

Operation. Ice Plant Operation, C. Wilkie. Refrig. Eng., vol. 11, no. 6, Dec. 1924, pp. 202-205. Deals with operation of ammonia compressor; ice freezing tanks, summary of ice-tank performance; ammonia condensers; thermometers and their location.

Prime Mover, Selection of. Choice of the Prime Mover for an Ice Plant, M. S. Howard. Power, vol. 60, no. 1, Sept. 9, 1924, pp. 403-405, 4 figs. Choice of power affected by local conditions; high fuel costs for steam plant; extra charge for electric current; Diesel-engine fuel costs.

Raw-Water. New Ice Service Co. Plant. Refrig. Wld., vol. 59, no. 6, June 1924, pp. 11-15, 9 figs. Description of 300-ton electrically driven raw-water ice plant on West 40th Street, New York City.

Oil Engine-Driven Raw Water Ice Plant at Mattoon, Ill. Ice & Refrigeration, vol. 66, no. 6, June 1924, pp. 513-517, 8 figs. Description of 30-ton plant of Mattoon Crystal Ice Co.; intended primarily for production of ice for refrigerator car service; 50 per cent of production to be used for requirements of local ice trade.

Raw Water Ice Plant of Miller Ice Co., Chicago Heights, Ill., V. P. Miller. Ice & Refrigeration, vol. 66, no. 3, Mar. 1924, pp. 239-241, 4 figs. Oil-engine-driven 50-ton ice-making plant, which has been remodeled and improved several times; mechanical equipment; vertical compressors belted to oil engines.

Serv-Ice Co. Builds New Electrically Driven Raw Water Ice Plant in Columbus, Ind. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 734-738, 5 figs. Describes new 30-ton compression system ice plant built to supply local retail trade. Unusually clear product is obtained by use of lime and soda softening and high-pressure agitation.

IGNITION

[See also FLAME PROPAGATION.]

Airplane Engines. See FLAME PROPAGATION, Spark Intensity.

Automobile Engines. Electric Ignition Apparatus for Motorcars. Eng. Progress, vol. 5, no. 7, July 1924, pp. 136-137, 3 figs. Discusses locating dynamo in engine flywheel, i.e., engine with flywheel magneto, and gives details of construction and connections.

Magnetos and Coils. Autocar, vol. 53, no. 1511, Oct. 3, 1924, pp. 629-631, 15 figs. Review of ignition appliances likely to be widely used in 1925.

Vacuum Tubes Applied to Engine Ignition. Automotive Industries, vol. 50, no. 24, June 12, 1924, pp. 1287-1289, 4 figs. Automotive application of thermionic valve, patented by Robert Bosch, makes it possible to place ignition system anywhere on car and eliminate mechanical interrupter.

Gas and Oil Engines. Process of Ignition in Gas and Oil Engines (Der Zündungsvorgang in Gas- und Oelmaschinen), R. Schöttler. Wärme, vol. 47, no. 33, Aug. 15, 1924, pp. 381-384, 14 figs. Discusses phenomenon of ignition and its control on basis of experimental work of various scientists.

Gases. See GASES, Ignition.

ILLUMINATING GAS. See COAL GAS.

ILLUMINATION

[See also LIGHTING.]

Rotating Objects. On a Method for the Synchronous and Instantaneous Illumination of Objects Rotating or Vibrating at Very High Speeds, G. E. Bairsto. Physical Soc. Lond.—Proc., vol. 36, part 5, Aug. 15, 1924, pp. 349-354, 3 figs. Describes method capable of giving instantaneous photographic records, and giving a precision of order of half a micro-second; is much more precise and able to give more intense spark than any contact breaker and coil method.

Wall Color Effect. Effect of Color of Walls and Soffits on Resulting Illumination (Effetti del colore delle pareti e dei soffitti sull'illuminazione risultante), L. F. Pello. Elettrotecnica, vol. 11, no. 23-24, Aug. 15-25, 1924, pp. 551-553. Discusses reflective power of various colors; gives table of coefficients of reflection and their application in industrial buildings, schools, etc.

ILLUMINOMETER. See LIGHT, Measuring Instruments.

IMMIGRATION

Continental, in Germany. Continental Immigration in Germany. Int. Labour Rev., vol. 9, no. 1, Jan. 1924, pp. 50-77. Control and compilation of statistics; issue of permits; recruiting and placing of workers; registration procedure; describes system of supervision and gives conclusions from results obtained.

Emigration and, Rights of. The Rights of Emigration and Immigration, P. Fauchille. Int. Labour Rev., vol. 9, no. 3, Mar. 1924, pp. 317-333. Author adopts theory that individual has inalienable natural right to emigrate or immigrate which may not be arbitrarily infringed by state, but admits that individual's right of migration is not absolute, but is limited by state's right of self-preservation.

IMPACT

Metals, Resistance to. See METALS, Impact Resistance.

IMPACT TESTING

Notched-Bar Tests. Measuring Metal's Resistance to Shock, R. G. Waltenberg. Chem. & Met. Eng., vol. 31, no. 17, Oct. 27, 1924, pp. 657-658. Study of impact tests on monel metal and new methods of obtaining figures indicative of toughness of metal tested.

On Notched-Bar Impact Tests, P. Fillunger. Testing, vol. 1, no. 1, Jan. 1924, pp. 23-32, 7 figs. Refers to formula for expressing energy to produce deformation in notched-bar impact specimen, and in order to show that equation is borne out by test results, investigation is made of several notched specimens of identical material but with different eccentricities.

Rounded Bars. Experiments on the Duration of Impacts, Mainly of Bars with Rounded Ends, in Elucidation of the Elastic Theory, J. E. P. Wagstaff. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. of Sci., vol. 48, no. 283, July 1924, pp. 147-158, 2 figs. Discusses duration of collision of two perfectly elastic bars and its form of mathematical relation.

INDEXES

Decimal Classification. The Nature, Purpose and Aim of Decimal Classification (Die Dezimalklassifikation. Ihr Wesen, Zweck und Ziel), E. Fontanellaz. Glasers Annalen, vol. 94, no. 4, Feb. 15, 1924, pp. 44-46. Discusses DK (Dewey) classification system and its advantages for arranging and indexing technical publications.

Management-Information Classification. Information Classification for the Management Adapted from the Dewey Decimal System. Mgmt. & Administration, vol. 7, no. 4, Apr. 1924, pp. 449-464. Presents table which represents consolidation of work of various parties interested; gives concise form standardized methods and accepted practice generally applicable to industrial operation; table of class numbers; subject index for management information.

INDICATORS

Internal-Combustion-Engine. Low Speed Indicator Developed for High Speed Engines. Automotive Industries, vol. 50, no. 6, Feb. 7, 1923, pp. 298-299, 3 figs. Device invented by Budapest scientist traces diagram which is representative of large number of succeeding cycles in power plant; influence of sources of error is greatly reduced; device known as Juhasz indicator has been placed on market by Lehmann & Michels of Hamburg, Germany.

The Juhasz Indicator (Mit dem Juhasz-Indikator), Wa. Ostwald. Allgemeine Automobil-Zeitung, vol. 24, nos. 47 and 48, Nov. 28 and Dec. 6, 1923, pp. 18-19 and 23-24, 4 figs. Describes new indicator which, it is claimed, gives accurate record of phenomena in combustion chamber, suction pipe, and exhaust pipe, even at maximum speeds.

Manograph, for High-Speed Engines. Indicator-Manograph (Indikator-Manograph Otto Schulze). Motor u. Auto, vol. 21, no. 1, Jan. 10, 1924, pp. 5-7, 8 figs. Describes optical indicator manufactured by OSA Apparate Gesellschaft, Frankfort, Germany, which can be used for speeds up to 8000 r.p.m.; diagrams are stated to be not only qualitatively but quantitatively correct, so that actual pressure conditions in cylinder can be determined.

Precision Weak-Spring. A New Precision Type Weak-Spring Indicator, J. Geiger. Oil Engine Power, vol. 2, no. 5, May 1924, pp. 278-279, 9 figs. Advantages of author's new type of engine indicator are illustrated.

INDIGO

History of. Some Pages from the Story of Indigo, W. A. Davis. Chem. & Industry, vol. 43, nos. 11 and 12, Mar. 14 and 21, 1924, pp. 266-268 and 303-307. Importance of industry; natural indigo and decline of its industry; indigo paste; development of business organization in India; introduction of indigo cultivation into Assam in conjunction with tea.

INDUCTANCE COILS

Inductance of, Calculation. Some Notes on Calculating the Inductance of Coils, E. J. Hobbs. Wireless World, vol. 13, nos. 18 and 19, Jan. 30 and Feb. 6, 1924, pp. 572-575 and 598-601, 5 figs. Describes simple method of reducing calculations to a minimum; based on use of powers of ten and is intended to assist in elimination of calculations and trial and error insofar as wavelength, inductance and capacity are concerned.

Lattice. The Inductance of Lattice Coils, J. G. Hart. Wireless Wld., vol. 15, no. 5, Oct. 29, 1924, pp. 133-134, 2 figs. Outlines a rapid method for calculation of inductance of lattice coils which extends graphical method of W. H. Nottage.

Low-Capacity. Low Capacity Inductance Coils, F. H. Haynes. Wireless Wld., vol. 13, no. 20, Feb. 13, 1924, pp. 613-616, 10 figs. Some new coils for short wave reception.

Natural Frequency. On the Measurement of Natural Frequency of an Inductance Coil at Audio-Frequency, H. Nukiyama and K. Kobayashi. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 429, Apr. 1924, pp. 400-405, 6 figs. Describes experiment in which frequency is determined by standard tuning forks; theory by which natural frequency and self-capacity of primary coil can be obtained by taking balance at two known frequencies is worked out. (In Japanese.)

Polygonal. Inductances of Polygonal Coils, I. Koga. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 435, Oct. 1924, pp. 954-977, 9 figs. Triangular, hexagonal and octagonal cases are treated with some calculations of mutual inductances between two linear conductors in general, assuming permeability of medium to be always unity throughout space. (In Japanese.)

Self-Inductance and Natural Wave Length. Self Inductance and Natural Wave Length of Single Layer Coils for Radio Use, I. Yamamoto. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 435, Oct. 1924, pp. 913-919, 4 figs. Gives curves necessary in designing single-layer coils, giving certain self inductances, curve showing total length of wire of coil, curves which determine approximate value of natural resonant wavelength of coil, and curves showing approximate value of equivalent self capacity of coil. (In Japanese.)

Single-Layer. Formulas and Tables for the Calculation and Design of Single-Layer Coils, F. W. Grover. Inst. Radio Engrs.—Proc., vol. 12, no. 2, Apr. 1924, pp. 193-208. Gives set of tables for simple calculation of inductance of single-layer helical and polygonal coils and their design together with full illustrations of their use.

INDUCTION

Electromagnetic. Electromagnetic Induction in a Homogeneous Solid Conducting Sphere Rotating About an Axis Perpendicular to a Uniform Alternating Magnetic Field, A. Marcus. Physical Rev., vol. 24, no. 1, July 1924, pp. 68-78, 2 figs. Discusses mathematical theory; tests theoretical results by measuring layouts including decrement of solid metal ball oscillating about vertical axis in an alternating field produced by long horizontal solenoid.

INDUSTRIAL MANAGEMENT

Advances in. Scientific Management in Other Countries Than the United States, F. B. and Lillian M. Gilbreth. Taylor Soc.—Bul., vol. 9,

no. 3, June 1924, pp. 132-142. Notes based on mass of foreign literature in authors' files; sources of scientific-management information available to other countries; expression of reactions to scientific management in other countries; objections advanced and obstacles encountered; methods advocated and found profitable; summary of present state; recommendations.

American Production Methods. American Production Methods (Amerikanische Gütererzeugung), Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 50, Dec. 13, 1924, pp. 1289-1292. General aspects of American industry; rapid production and turnover; handling workshop materials and utilization of machines; industrial organization; accurate planning of production method, training of employees, etc.; sales methods.

Average Costs, Fallacy of. A Fallacy of Management—That Average Costs Are of Any Value, B. M. Maynard and J. Heywood. Factory, vol. 32, no. 3, Mar. 1924, pp. 330-331 and 366, 1 fig. Discussion based on varied experience with industrial engineering in many plants.

Bonus Systems. See BONUS SYSTEMS.

Branch Plants, Management of. How We Get Uniform Output from Widely Separated Plants, P. W. Litchfield. Factory, vol. 33, no. 1, July 1924, pp. 23-25, 116, 118 and 120-123, 2 figs. How to manage branch plants so that they function as one; how to do it and get a uniform product; how economies of one plant get adopted in others located at distant points.

Budgetary Control. Budgetary Control, W. Carswell. Paper Trade Jl., vol. 79, no. 7, Aug. 14, 1924, pp. 51-54 and 60. Outlines general principles of budgetary control in relation to all principal activities of an enterprise which apply with equal value to any business, whether manufacturing, trading, or merchandising. Discussed under following heads: Advantages to be gained by operating under a budget; preparation of budget; control.

Using the Budget System in Business, L. H. Charles. Can. Mfr., vol. 44, no. 12, Dec. 1924, pp. 23-25. How to apply budget system and use it to secure great benefits of forecasting accurately.

Visualizing Budgetary Control, E. H. Tingley. Mgmt. & Administration, vol. 8, no. 4, Oct. 1924, pp. 383-386, 1 fig. Major benefits of a budget; make-up of chart; steps in planning and compilation of budget.

Budgeting. Applying the Budget System to Railroads, H. Bruere and A. Lazarus. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 35-46, 12 figs. Review of present practice and forecast of future possibilities.

Budget Methods of Metal Product Company. Iron Age, vol. 114, no. 15, Oct. 9, 1924, pp. 910-912. Describes budget system of Cleveland Metal Products Co., Cleveland, Ohio. Sales estimated in November for following year and manufacturing program planned. Selling expense, advertising, and administration budgeted.

Budgeting Advertising Expense, J. L. Palmer. Mgmt. & Administration, vol. 8, no. 4, Oct. 1924, pp. 394-395, 3 figs. Develops, by assuming a typical case, a possible method of planning and controlling advertising expenditures.

Elements of Budget Control, D. J. Hutchinson. Pit & Quarry, vol. 8, no. 10, July 1924, pp. 75-78. Procedure in establishing budget system.

Industrial Budget Methods, J. H. Barber. Mgmt. & Administration, vol. 8, nos. 4, 5, and 6, Oct., Nov., and Dec., 1924, pp. 371-376, 479-486, and 589-594, 27 figs. Oct: Explains methods of scientific forecasting and shows results that can be attained. Nov.: Methods of quantitatively analyzing particular cycles (of orders, shipments, collections, etc.) of particular business. Dec.: Forecasting underlying cycles.

Central Stations. Management Charts for Central Stations, H. A. Snow. Elec. Wld., vol. 84, no. 1, July 5, 1924, pp. 12-16, 25 figs. How a series of graphs effectively presented keeps executives posted on utility output, extensions and financial requirements as exemplified by experience of Detroit Edison Company.

Charts. See Gantt Charts; CHARTS.

Coal Mines. The Application of Industrial Engineering to the Coal Mining Industry, J. C. White. Coal Mine Mgmt., vol. 3, no. 12, Dec. 1924, pp. 23-26. Objects of management; value of coördination; basic principles of scientific management.

See also COAL MINES, Underground Management.

Committee Plan. Committees as Aids to Management, A. G. Peter. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 362-365. Advantages and disadvantages of this form of executive control.

Control Methods. Efficiency Cards, a Means of Operating Control and Precalculation (Die Leistungskarte, ein Mittel der Betriebskontrolle und der Vorrechnung), M. Krage. Maschinenbau, vol. 3, no. 21, Aug. 14, 1924, pp. 786-790. Efficiency card collects data on material and time consumed in course of production from store cards and time cards; compares operations and actual expenditure in time and materials with estimates given.

Graphic Control in a Small Hosiery Mill, W. E. Haseltine. Mgmt. & Administration, vol. 8, no. 2, Aug. 1924, pp. 161-166, 20 figs. How charts are employed in a small hosiery mill to give control of all factors entering into operation, showing status of work at any time and schedule for its completion.

Cost Accounting. See COST ACCOUNTING.

Cost Control. Control Through Organization and Budgets, Thos. B. Fordham and Ed. H. Tingley. Mgmt. & Administration, vol. 7, nos. 1 and 2, Jan. and Feb. 1924, pp. 57-62 and 205-208. Jan.: Compilation of budget. Feb.: Applying budget to industrial operations.

Cost Control by Budget, Thos. B. Fordham and E. H. Tingley. Mgmt. & Administration, vol. 7, no. 3, Mar. 1924, pp. 291-294, 1 fig. Points out advantages to be gained by budget analysis; operating factory divisions by budget.

How We Keep Costs at Their Proper Level, E. F. Roberts. Factory, vol. 33, no. 5, Nov. 1924, pp. 650-653, 710, 712, 714, and 716, 2 figs. Tells how Packard Motor Car Co. cost-control system, with no red tape and at minimum cost, serves production executive as tool, instead of being merely record of past events.

Increased Yield from Industry (Voksende Udbytte i Industrien), I. Jantzen. Ingeniören, vol. 33, nos. 7 and 8, Feb. 16 and 23, 1924, pp. 73-84 and 85-96, 26 figs. Scientific investigation of economic factors on basis of engineering principles. Gives diagrams illustrating relations of manufacturing cost, price, profit, etc.

Operating Adjustments Under Standard Costs, R. W. Darnell. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 183-186. Perpetual inventory as essential element of effective cost control, its function, place in system of standard costs, and its monthly adjustment to meet inevitable discrepancies between standard and actual costs.

Quality Manufacturing at Predetermined Costs, E. F. Roberts. Factory, vol. 33, no. 4, Oct. 1924, pp. 495-497, 544, 548, 552, 556, 560, 564, and 568, 3 figs. Describes how Packard Motor Car Co. established time standards and how workmen

are paid so that variations in time and in cost of labor are kept at minimum; advantages of payment method which is integral part of cost-control system.

Statistical Summary and Abstract. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 198-220. Details of practice in cost organization and in executive utilization of cost data obtained from 160 American industrial concerns employing aggregate of 500,000; tabular summary of cost-control practice in 160 plants (on supp. table); relation of timekeeping to cost work in 64 plants; relation of rate setting to cost; relation of cost department to control of materials; procedure with respect to compilation and distribution of overhead; how 57 concerns use cost data to prevent excessive costs; how foremen are brought in touch with cost and expense records; steps taken in 65 plants to reduce material investment; how 30 concerns handle idle facilities; steps taken to analyze and reduce shrinkage of materials; how cost analysis dictates programs of economies; use of employees' suggestion plan and its relation to costs; outstanding ways in which 78 industrial concerns use cost data for executive control. Points embraced in questionnaire which forms basis for summarized data, p. 197.

Cost Information for Department Heads. Supplying Financial and Cost Information, G. M. Pelton. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 169-172. Discusses how and to what extent department heads should be supplied with financial and cost information.

Cotton Mills. See COTTON MILLS, Mechanical Engineering and Management.

Definition of. Who Can Hire Management?, H. S. Dennson. Taylor Soc.—Bul., vol. 9, no. 3, June 1924, pp. 101-110. Notes on what is "managing," who manages, and who can best choose managers.

Development. A Decade's Development in Management, H. P. Kendall. Taylor Soc.—Bul., vol. 9, no. 2, Apr. 1924, pp. 55-65. Trends and results of scientific management; developments in manufacturing problems; industrial relations; scientific management and selling.

Drafting Department. Putting the Drafting Room on a Production Basis, W. E. Irish. Indus. Mgmt. (N. Y.), vol. 68, no. 2, Aug. 1924, pp. 121-126, 2 figs. A system which, being based on fundamentals, is flexible enough for wide application.

Elements of Work, Classification of. Classifying the Elements of Work, F. B. Gilbreth and L. M. Gilbreth. Mgmt. & Administration, vol. 8, nos. 2, and 3, Aug. and Sept. 1924, pp. 151-154 and 295-297, 2 figs. Aug.: A complete method of visualizing a classification of all subdivisions and true motion-study elements of the one best way to do work. Sept.: Application of motion study to developing best methods of work.

Employment Management. See EMPLOYMENT MANAGEMENT.

Engineering and Operating Departments, Relation of. The Relation of the Engineering Department to the Operating Department, F. J. Crolius. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 2, Mar. 1924, pp. 45-52 and (discussion) 53-55. Relates incidents and results accomplished through coördinated engineering investigation; discusses combustion, centrifugal force; etc.

Estimating. Estimating. Engineer, vol. 137, no. 3558, Mar. 7, 1924, pp. 244-246, 5 figs. Deals with requirements of factory employing about 5000 hands, and manufacturing more than one type of product; personnel of department; preparation of estimate; coördination of effort.

See also CONTRACT WORK, Estimating.

Executive Control. Executive Control of Future Results, Wallace Clark. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 179-182, 4 figs. Graphical method of company plan and performance.

Executive Function. Management as an Executive Function, J. H. Williams. Taylor Soc.—Bul., vol. 9, no. 2, Apr. 1924, pp. 66-71. Emphasizes modern biology and psychology as essential to development of science of management.

Executives. See EXECUTIVES.

Executives' Clubs. A Comprehensive Plan for Executives' Clubs, S. Van T. Jester. Ry. Mech. Engr., vol. 98, no. 2, Feb. 1924, pp. 79-80. Outline of principles involved and methods followed in Jester plan.

Executives, Duty in. Essentials of Successful Management, W. Attwood. Indus. Management (Lond.), vol. 11, no. 1, Jan. 10, 1924, pp. 11-12, Stresses necessity for industrial executives to follow a well-defined policy in their administration in order to produce a maximum output.

Expense Control. A Method of Expense Control That Paid, M. R. Lott. Indus. Mgmt. (N. Y.), vol. 67, no. 5, May 1924, pp. 284-286, 2 figs. Keeping down cost of improvements; describes method which has proved of great benefit in controlling cost of work of expense nature, where large sums are involved.

Factories. Rational Works Management in Factories, J. A. Davenport and J. Inman Emery. Indus. Mgmt. (Lond.), vol. 11, nos. 1 and 7, Jan. 10 and Apr. 3, 1924, pp. 3-5 and 179-189, 4 figs. Jan. 10: Payment by results. Apr. 3: Systematic departmental coöperation.

Factory Maintenance. Maintenance: Gearing Up Both Plant and Equipment for Low-Cost Production, K. D. Hamilton. Factory, vol. 33, nos. 3, 4, 5, and 6, Sept., Oct., Nov., and Dec. 1924, pp. 332-335, 406, 408, 410 and 412, 1 fig.; 498-501, 570, 572, 574, 576 and 578, 3 figs.; 645-649, 716, 718, 720, 722, 724, 726, and 728, 10 figs.; and 790-794, 820,822, 824, 826, 828, and 830, 13 figs. Sept.: Functions of maintenance department as related to plant and equipment. Oct.: Organization of maintenance department. Nov.: Plant design, construction, and alteration. Dec.: Belts, shafting, and hangers.

Fatigue. See FATIGUE.

Financial Control. Mobilization of Cash Reserves, A. H. Swayne. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 21-23. Methods employed by General Motors Co. in releasing funds for use as general working capital; how cash was made more fluid; interest and banking relations; savings in interest.

The Mechanics of Profit-Making, P. Mathewson. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 659-661, 5 figs. Graphic plan of analyzing effect of proposed changes, which may be adapted to any business; purpose is to show and emphasize logical relations between departments and various factors that must be taken into account in estimating future operations and profits.

Working Plans to Realize Profits, G. C. Harrison. Mgmt. & Administration, vol. 8, nos. 4, 5, and 6, Oct., Nov., and Dec., 1924, pp. 361-366, 491-495, and 605-610, 9 figs. Oct.: Need for science in industry; scientific management in business; estimating business costs. Nov.: Setting sales quotas. Dec.: Determining profits in advance.

Flow-of-Work Regulation. Effecting Economies by Regulating Work Flow, A. Whitehead. Indus. Mgmt. (Lond.), vol. 11, nos. 2, 4, 7, 10, 15, and 18, Jan. 24, Feb. 21, Apr. 3, May 15, Sept. and Dec. 1924, pp. 35-37, 98-99, 183-185, 263-264, 407-408, and 497-498, 8 figs. How costing reveals production losses. Orders and deliveries of raw materials. Charting for production. Avoiding delay in production. Keeping record of output.

France. Present State of Scientific Management (L'organisation scientifique des entreprises et du travail. Son état actuel.), J. Ottenheimer. Génie Civil, vol. 85, no. 21, Nov. 22, 1924, pp. 468-471. Principles of Taylor system, and application at Berliet works; its extension by Fayol to general administration.

Functions. Management Is Life of Business, C. B. Williams. Iron Trade Rev., vol. 75, no. 22, Nov. 27, 1924, pp. 1434-1437. Interpretation of its functions, in conjunction with ten great rules of conduct; how organization through which it works reflects its spirit.

Gantt Charts. Applying the Gantt Chart in France, S. Héranger. Mgmt. & Administration, vol. 8, no. 3, Sept. 1924, pp. 305-309, 5 figs. Gantt Chart as applied in two establishments of Société Anonyme des Anciens Etablissements Hotchkiss & Cie, one situated at Saint-Denis, producing automobiles, and other at Levallois-Perret, manufacturing Hotchkiss machine gun and machine rifle. Has given management of Société an efficient means of controlling progress of work and has proved beyond question its value as an important factor in increased production.

Germany. Inside a German Factory, C. W. Goerling. Factory, vol. 33, no. 5, Nov. 1924, pp. 642-644, 680 and 684, 1 fig. German management problems based on experiences in a factory in Stuttgart.

Hosiery Plant. The Development of a Modern Hosiery Plant, S. E. Thompson and H. T. Rollins. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 752-764, 13 figs. Development of large hosiery plant in Iowa during 32 years of its existence; discusses production control, personnel service, standardization of methods and incentives, cost control, and marketing.

Idleness Control. The Control of Idleness in Industry, W. L. Conrad. Mech. Eng., vol. 46, no. 7, July 1924, pp. 402-404. Points out that one of chief causes of loss in industry is idleness of plant and personnel, due to lack of orders or to causes within plant itself; accounting system can be made to show not only cost of idleness, but also its causes, and to indicate means of their control.

Inefficient Machinery, Cost of. How Much Are Inefficient Machines Costing You?, K. H. Condit. Am. Mach., vol. 61, no. 12, Sept. 18, 1924, pp. 451-452, 1 fig. Machine equipment sets production limits. Keeping track of cost of inefficient machines. Cost data show when to throw out obsolete equipment.

Information Classification. See INDEXES, Management-Information Classification.

Inspection. See also INSPECTION.

Inspectors' Card Systems. A Card System to Help the Inspector, K. H. Crumrine. Am. Mach., vol. 61, no. 9, Aug. 28, 1924, pp. 349-350, 4 figs. How inspector can be aided by engineering department.

Inventories. See Purchasing.

Job Preparation. Preparing Jobs for Large-Scale Production (Das Aufgebeverfahren im Grossbetrieb), E. Holtzhausen and L. Haack. Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. 981-984, 5 figs. Discusses preparation of drawings, lists and orders, marking of drawings and detail drawings, models, etc., for individual and large-scale production.

Jobbing Orders, Handling. Handling the Jobbing Order, E. W. Leach and J. F. Keeh. Am. Mach., vol. 61, no. 16, Oct. 16, 1924, pp. 603-607, 9 figs. Points out necessity for suitable system in jobbing department; forms and procedure; costs and deliveries; service book.

Lignite Mines. See LIGNITE, Mine Management.

Machine-Building Industries. Management Problems in Machine Building Industries, E. F. Du Brul. Am. Mach., vol. 60, no. 20, May 15, 1924, pp. 717-721, 2 figs. Effect of business cycle on management policies; handicaps under which builder of production equipment must work; profits of fat years must cover losses suffered in lean ones.

Maintenance Division Organization. Organization of Maintenance Division, F. A. Waldron. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 39-42, 4 figs. Planning its duties for economy of operation.

Maintenance Work. Analysis of Work and Responsibilities of Maintenance Engineers, D. H. Braymer. Indus. Engr., vol. 82, no. 1, Jan. 1924, pp. 10-16, 8 figs. Discusses scope of maintenance work, with comments by readers on most effective methods of organizations, division of work, and assignment of duties.

Managing Maintenance Work with Economy, T. Clark. Mgmt. & Administration, vol. 8, nos. 2 and 3, Aug. and Sept. 1924, pp. 191-196 and 299-302, 11 figs. Describes application to a construction and maintenance department of a manufacturing plant, of a complete system of planning and routing work, and payment of bonuses based on times determined by accurate time study. Methods of determining and using standard times for repair work.

Materials Purchasing and Control. Extreme Variety Versus Standardization, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 81-88, 15 figs. Raw-material ordering routine at Schenectady plant of Gen. Elec. Co.

One Master Form Basis of Material Buying and Control System, W. L. Carver. Automotive Industries, vol. 50, no. 15, Apr. 10, 1924, pp. 806-811, 6 figs. Scheme of material purchasing and control at plant of Chandler Motor Car Co. eliminates bookkeeping from purchasing, stock, and production departments.

The Control of Materials, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 67, no. 5, May 1924, pp. 310-318, 16 figs. Survey of theory and practice; author seeks to develop system of control which will permit most efficient procurement and utilization of material.

Metal-Working Trades. The Mechanical Engineering of Management in the Metal-Working Trades, Robt. T. Kent. Mech. Eng., vol. 46, no. 5, May 1924, pp. 272-273 and 307. Good mechanical engineering is shown to be essential to good management in metal-working trades; engineering preliminaries to time study; engineering in plant; methods and equipment.

Methods and Principles. Scientific Management (Wissenschaftliche Betriebsführung), H. Riessberg. Praktische Maschinen-Konstrukteur, vol. 57, nos. 23, 26, 27, 29, 42, 43, 44, and 45, June 24, July 15, 22, Aug. 5, Nov. 4, 11, 18, and 25, 1924, pp. 317-324, 365-369, 381-384, 405-409, 566-568, 573-576, 592-594, and 609-611, 62 figs. Series of articles discussing various methods of scientific organization and management, taking small railway operation as an example; management of machine-tool park, machine-tool operation, etc.

Shop Management, Fred. W. Taylor. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 806-807. Summary of paper presented in June, 1903, dealing with management; high wages and low labor costs; planning development; functional management and foremanship; objections to usual systems of wage payment; recommended wage system; time study; personnel relations and welfare work.

Motion Study. See MOTION STUDY.

Nature of. Operating Management, a Link Between Technics and Economics (Betriebswirt-

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schaftslehre), A. Walther. Schweizerische Bauzeitung, vol. 84, no. 8, Aug. 23, 1924, pp. 94-99. Discusses Betriebswissenschaftslehre as independent science concerned with economic "carrying on" of producing concern and including besides technical and labor management also questions of capital, credit, information and transportation.

Order System. Central Office and Branch Yard Millwork Order System, T. C. Herrington. Wood-Worker, vol. 43, no. 5, July 1924, pp. 42-44, 4 figs. Describes effective but simple millwork order, billing, and scheduling system, which has been developed and is being used by large lumber and millwork concern operating one main plant and four branch yards in Detroit, Mich.

Planning. A Co-ordinated System of Planning, Routing, and Cost Accounting, F. A. Waldron. Mgmt. & Administration, vol. 7, nos. 1, 2, 3, and 4, Jan., Feb., Mar., and Apr. 1924, pp. 39-43, 173-177, 295-297, and 427-430, 34 figs. Jan.: Duties of engineering division. Feb.: Organization of production division. Mar.: Organization of inspection and maintenance. Apr.: Organization of accounting division.

Planning and Production Control. Taylor Soc. —Bul., vol. 9, no. 6, Dec. 1924, pp. 271-283. Committee on industrial planning of Boston Chamber of Commerce presents composite picture of planning methods found effective in Boston's most efficient factories. Organizing for master planning; determination of method of control; definition of production control; its value in industrial management.

Planning System in a Car Manufacturing Plant. Ry. Rev., vol. 74, no. 9, Mar. 1, 1924, pp. 357-365, 15 figs. System of scheduling car-repair work in shops of Ralston Steel Car Co., Columbus, Ohio; exercises complete control of all manufacturing activities.

Planning the Repetitive Manufacture of Automobile Wheels, Wm. B. Ferguson. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 31-38, 70 figs. Methods used in quantity production or making of great number of parts of same design with respect to those features which are more or less peculiar to this class of work.

The Problem of Planning and Its Solution (Das Problem der Vorkalkulation und seine Lösung), K. Hegner. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 32, Aug. 9, 1924, pp. 821-824. Object of modern planning system to fix time of production and to improve methods of production; standardizing bases of methods of calculation, etc.

See also Production Planning.

Planning Department. The Planning Department (Das Konstruktionsbüro), H. Menge, A. Eckers, O. Hoffman and L. Voigt. Maschinenbau, vol. 3, no. 19, July 10, 1924, pp. 679-703, 14 figs. Series of articles covering object and importance of planning department; index to drawings; systematic grouping of machine parts on basis of function, etc.; drawing machines, etc.

Plant Layout and Production. Co-Ordinating Plant Layout with Production, C. G. Stoll. Soc. Indus. Engrs.—Bul., vol. 6, no. 12, Dec. 1924, pp. 3-7. Planning plant layout at plant of West. Elec. Co.; production branch; industrial relations; operating, inspection, and clerical branches; development branch.

Prague Congress. Congress on Management Held at Prague. Iron Age, vol. 114, no. 9, Aug. 28, 1924, pp. 500-501. Presentation of American methods for benefit of nations of central Europe. Nature of scientific management, human element in management, budget and production control, education for management, Skoda and Witkowitz works.

Scientific Management at Prague Conference. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 624-625. Brief abstracts of papers by American authors presented at First International Management Congress held at Prague, July 20-24, 1924, treating of management problems including industrial relations, budgetary control and education.

Pricing Policy. Pricing Policy in Relation to Financial Control, Donaldson Brown. Mgmt. & Administration, vol. 7, nos. 2, 3, and 4, Feb., Mar., and Apr., 1924, pp. 195-198, 283-286, and 417-422. Outlines method of price analysis which, though resting upon theoretical basis, is wholly practical; theory of pricing of Gen. Motors Corpn.

Principles. The Principles Underlying Good Management, H. Diemer. Indus. Mgmt. (N. Y.), vol. 67, no. 5, May 1924, pp. 280-283. Investigation and standardization; comprehensive planning; preparation; inspection and records; wage incentives; control; mutual confidence and co-operation.

Printed Forms. The Designing of Printed Forms, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 235-241, 7 figs. Discusses principal points to be considered in design of forms.

Problems. Problems of Engineering Management. Eng. Production, vol. 7, nos, 142, 143, 144, 145 and 146, July, Aug., Sept., Oct. and Nov., 1924, pp. 199-200, 223-224, 255-256, 309-310, and 335-336, 2 figs. Practical notes on factory administration and executive method. Discusses some incentives to increased production; organizing for work. Oct.: Human factor in industry. Nov.: Standardization and planning.

Production Control. A Workable Production Control Plan for the Small Plant, A. A. Dobson. Factory, vol. 32, no. 5, May 1924, pp. 652-654, 5 figs. Stock file of tickets are printed in addressing machine using metal plates; tickets required in system are store's issue, time ticket, job ticket, move ticket, and work tag.

A Workable Production Control System, E. Davis. Am. Mach., vol. 60, nos. 21, 23, and 25, and vol. 61, no. 1, May 22, June 5, 19, and July 3, 1924, pp. 753-757, 835-838, 911-914, and 7-10, 23 figs. Describes recently developed control system. May 22: Essential features; control based on periodic interdepartmental shipments of predetermined amounts of material. June 5: How production is planned; determination of interdepartmental shipment periods and amounts; production rates determined by department heads; raw-material control. June 19: Plans and procedure for shop orders and shipping schedules; production control board; delayed and advance shipments. July 3: Explains inspection and checking methods and gives advantages of system.

Can the Delivery Problem be Solved? (Ist das Terminproblem lösbar?), H. D. Brasch. Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. 979-981. Discusses difficulties encountered in determining time of delivery in factory production, and gives example of a special case in a medium-sized plant.

Control that Makes Possible Our 30-Day Turn, R. J. Reiser. Factory, vol. 33, no. 6, Dec. 1924, pp. 786-787, 844 and 846, 3 figs. Method of control adopted by manufacturing firm, making woodworking machinery.

Design, Manufacture, and Production Control of a Standard Machine, R. E. Flanders. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 873-878, 13 figs. See also Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 881-888, 20 figs. and (abstract) in Iron Trade Rev., vol. 75, no. 24, Dec. 11, 1924, pp. 1573-1578, 9 figs. Describes methods by which difficulties in manufacture and production control were avoided by Jones & Lamson Machine Co.; principles sought to be established were

standardization of product; separate manufacturing equipment and organization for product; departmentalization by product rather than by process; recurrent production schedule; concentration of plant; minimized transportation; visual control of work itself instead of remote control by records; automatic control of inventories; etc.

Enter Order—When Will You Ship? H. S. Riggs. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 643-645, 5 figs. Lodge and Shipley methods for controlling production.

Extreme Variety Versus Standardization, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 67, no. 6, June 1924, pp. 343-347, 8 figs. How work has been systemized and how production control is exercised in induction-motor department of Gen. Elec. Co. at Schenectady Works.

Following Up Production in a Three-Stage Process (Terminverfolgung und Arbeitsverteilung im Dreistufen-Verfahren), E. Sachsenberg. Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. 975-979, 9 figs. Details of division and control of quantity production in a galalith pearl factory with samples of work cards used.

How We Maintain a Smooth Flow of Production, E. F. Roberts. Factory, vol. 33, no. 6, Dec. 1924, pp. 794-797, 852, and 854, 2 figs. Tells how Packard Motor Car Co. production executives and foremen work together in using schedule-control board to maintain profitable manufacturing conditions.

Maintaining a Profit with Reduced Prices, E. A. Munschauer. Mgmt. & Administration, vol. 7, no. 4, Apr. 1924, pp. 401-404, 4 figs. How capacity of plant for manufacturing refrigerators was increased 50 per cent and unit costs lowered.

Production Control, Geo. D. Babcock. Taylor Soc.—Bul., vol. 9, no. 6, Dec. 1924, pp. 260-270, 3 figs. See also Am. Mach., vol. 61, no. 25, Dec. 18, 1924, pp. 963-970, 3 figs. Outline of subject of production control in manufacturing, taking up for consideration respectively actual output with given equipment; preplanning; establishment of manufacturing programs; determination of lot sizes; establishment of production schedule; operation analysis; stores systems; dispatching of work; inspection; maintenance; and forms.

Production Control (Die Kontrolle der Produktion), K. Hegner. Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1119-1124, 17 figs. Proper use and exploitation of auxiliaries in production control before and during production, especially control of machines and superintendence of workers.

Results of Scientific Management from the Viewpoint of Corporate Control, M. M. Baker. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 645-646. Discusses general effect of scientific management upon entire organization of manufacturing institution.

See also Planning.

Production-Costs Reduction. The Reduction of Production Costs, H. Varley. Indus. Mgmt. (Lond.), vol. 11, nos. 2 and 16, Jan. 24 and Oct. 1924, pp. 41, and 437-440, Jan. 24: General observations. Oct.: Cost of machine idleness; justification for new machine; saving of handling time; relative cost of operation; replacing machinery every year.

Production Increase. Increase of Production (Menschenwirtschaft). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 17, Apr. 26, 1924, pp. 405-413, 30 figs. Discusses increase of production by increasing present efficiency of workmen, by harmonizing their operation with the machinery they employ, and by providing them with intelligent direction and supervising.

No Safe Short Cut to High Production, H. H. Farquhar. Am. Mach., vol. 61, no. 19, Nov. 6, 1924, pp. 727-729. Effect of installing incentive-payment schemes without proper preparation; efforts to increase production must suit local conditions; responsibilities of management and its essential functions.

Production Planning. A Flexible Method of Production Planning for the Job Shop, E. W. Palmer. Factory, vol. 32, no. 3, Mar. 1924, pp. 321-324, 392 and 394, 5 figs. Method devised by author's own organization.

New Methods of Production Planning That Make Heavy Stocks Unnecessary. Factory, vol. 32, no. 4, Apr. 1924, pp. 480-482 and 528, 1 fig. Methods employed in large machine-tool manufacturing plant, in which standardization is stressed; how production budget aids planning.

Production and Sales, Coördination. Coordination of Production with Sales for Oil Companies, E. G. Reynolds. Mgmt. & Administration, vol. 7, no. 1, Jan. 1924, pp. 85-89, 2 figs. Setting production schedule; adjustment of estimated production and sales; interpretation of revised quota; types of records necessary to execute plan; regulation of refinery operations.

Psychological Methods, Application of. What Industrial Psychology Asks of Management, W. V. Bingham. Taylor Soc.—Bul., vol. 9, no. 6, Dec. 1924, pp. 243-248. States that the industrial psychologist asks of management patience, discrimination and research opportunities, as well as reliable criteria, each of which is considered in turn.

Psychology in Industry. Industrial Psychology, H. S. Person. Taylor Soc.—Bul., vol. 9, no. 4, Aug. 1924, pp. 163-171. Discusses psychology as science of nature and causes of conduct and of its control, and problems of psychology in industry.

Psychology, Relation of. The Achievements of Motion Psychology, Frank B. and Lillian M. Gilbreth. Taylor Soc.—Bul., vol. 9, no. 6, Dec. 1924, pp. 259 and 283-285. Review of progress which has actually taken place in correlating psychology and management during past 20 years; summary of actual results in field of industrial psychology.

The Basis of Industrial Psychology, E. Mayo. Taylor Soc.—Bul., vol. 9, no. 6, Dec. 1924, pp. 249-259. Points out that psychology of total situation is basic to psychology of management; methods of psychological inquiry; academic psychology; medical psychology; conclusions from medical investigation; total situation and the individual.

Pulp and Paper Industry. Paper and Pulp Manufacturing, S. E. Thompson and W. E. Freeland. Mgmt. & Administration, vol. 8, no. 4, Oct. 1924, pp. 397-402, 6 figs. Job standardization, wage incentives, and bonus plans of general application.

Purchasing. The Relationship of Purchasing to Inventories, H. N. Stronck. Factory, vol. 32, no. 4, Apr. 1924, pp. 501-503, 606, and 608-609. Notes based upon observations made during examination of manufacturing enterprises of large variety of industries, and in all parts of country.

The Science of Buying Material, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 19-23. Notes on purchasing agent's contribution to smooth production flow.

See also Materials Purchasing.

Purchasing Agents. The Qualifications of a Purchasing Agent, C. T. Yates. Taylor Soc.—Bul., vol. 9, no. 5, Oct. 1924, pp. 230-232. How purchasing agent functions and what he contributes in scientifically managed plant.

Quality Measurement. Measurement of the Quality of Product, G. S. Radford. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 546-547 (includes discussion). Considers possibility of reducing control of quality and inspection function to a mathematical basis, and concludes that this is neither feasible nor desirable. Sets up standards by which performance of inspection division can be judged.

Rate Setting. Rate Fixing in Engineering Works. Machy. (Lond.), vol. 24, no. 617, July 24, 1924, pp. 516-518, 2 figs. Payment by results and rate-fixing methods; share of production responsibilities by management and labor.

Raw-Material Control. See MATERIALS, Care and Control.

Records. The Works Records Department, W. J. Hiscox. Indus. Mgmt. (Lond.), vol. 11, nos. 1, 3, 6, and 10, Jan. 10, Feb. 7, Mar. 20, and May 15, 1924, pp. 6-7, 67-69, 151-152, and 265-266, 9 figs. Describes its function, dealing with delays, what records should show, stock records and costing, and employment records.

Reorganization Scheme. Reorganisation on Practical Lines. Eng. Production, vol. 7, no. 147, Dec. 1924, pp. 367-368. Describes reorganization scheme adopted by small factory concerned with manufacture of assembled unit upon repetition lines.

Returned Goods in Jobbing Plant. Returned Goods in the Jobbing Plant, E. W. Leach and J. F. Koch. Am. Mach., vol. 61, no. 20, Nov. 13, 1924, pp. 757-759, 3 figs. Points out that returned goods is charge against profits of business; necessary procedure and forms for disposition of returned pieces; how returned goods may be decreased.

Routing. Perspective Routing, P. K. Guillow. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 242-243, 4 figs. Time-saving suggestion for intelligent routing of production.

Production, D. Bennett. World Power, vol. 2, no. 12, Dec. 1924, pp. 319-322, 4 figs. Deals with problems to be dealt with by works manager in producing raw materials and details parts at times required for next succeeding operation, and eventually for completion of work in hand on due date originally arranged; traces steps in handling order; example of job production program.

See also Planning.

Sales. An Example of Scientific Marketing Procedure, S. Cowan. Taylor Soc.—Bul., vol. 9, no. 3, June 1924, pp. 143-151, 3 figs. Method of analyzing buying groups and circulation: comparing occupational and income groups; analysis of magazine circulation; circulation by occupational groups. Practical applications.

Analysis of Salesmen's Quotas, A. R. Burnet. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 487-490, 3 figs. Equitable determination and visualizing results.

Coördination of Sales and Production, Jos. H. Barber. Taylor Soc.—Bul., vol. 9, no. 3, June 1924, pp. 111-131, 10 figs. How Walworth Mfg. Co. establishes precise sales-production schedules.

Tendencies in Sales Management, S. Cowan. Taylor Soc.—Bul., vol. 9, no. 2, Apr. 1924, pp. 72-85. Consideration of influence of scientific-management attitude of mind on selling and advertising; scientific analysis of marketing problems; scientific planning of sales activities; executive responsibility.

See also Production and Sales.

Salvage Control. Salvage Control by the Inspection Department, A. H. Frauenthal. Am. Mach., vol. 61, no. 24, Dec. 11, 1924, p. 912, 1 fig. Simple and effective method of keeping in touch with scrap losses as affecting both production and accounting departments.

Service Methods. Service, W. L. Wise. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 274-276 and 318. Applications of basic principles of service as developed by Nat. Cash Register Co., Dayton, Ohio, are suggested for promulgation in automotive industry, following statement of methods employed in servicing cash registers.

Shipping Methods. From "Order Received" to Freight-Car Door, J. M. Schappert. Factory, vol. 33, no. 1, July 1924, pp. 45-47 and 141-142, 13 figs. Complete shipping system of Metal Stamping Co.

Shoe Factories. Management Factors in the Shoe Industry, S. E. Thompson and W. E. Freeland. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 75-81, 8 figs. Methods which solve marketing and manufacturing problems.

Shop-Cost Reduction. See MACHINE SHOPS, Cost Reduction in.

Simplification. A Bibliography of Articles on Simplification. Factory, vol. 32, no. 3, Mar. 1924, pp. 318-320. Classified list of periodical articles, government reports, and special reports.

Just How Far Does It Pay to Go with Simplification?, F. H. Montgomery. Factory, vol. 32, no. 2, Feb. 1924, pp. 153-156 and 260, 3 figs. President of Knox Hat Co. tells how plan of simplification was carried out in manufacture of soft hats.

Simplified Practice. See U. S. BUREAU OF STANDARDS, Division of Simplified Practice.

Small Factories. Management Difficulties in Small Factories, and Their Solution, H. W. Ross. Indus. Mgmt. (Lond.), vol. 11, nos. 8, 14, and 17. Apr. 17, Aug., and Nov., 1924, pp. 207-208, 377-378, 467-468 and 470. Apr. 17: Common examples. Aug.: Purchase of materials. Nov.: Credit rating.

Profitable Methods for the Small Factory, G. C. Brown. Mgmt. & Administration, vol. 7, nos. 2, 3, 4, 5, and 6, and vol. 8, no. 1, Feb., Mar., Apr., May, June, and July, 1924, pp. 161-167, 305-310, 431-436, 567-572, 689-692, and 53-58, 22 figs. Feb.; Organization of departments and functions. Mar.: Production control in small organization. Apr.: Time study and standardization. May: Wage incentives and profit sharing. June: Distribution of overhead to jobs. July: Recording job costs to show profits.

Statistical Analyses. Analyzing Statements of Operating Results, Geo. S. Cremer and Wm. R. Drachbar. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 507-508, 3 figs. Gives some of the uses of deep-cutting statistical analyses.

Mass-Number Investigation, Reliability of Technical Measurements, and Dispersion (Grosszahlforschung, Zuverlässigkeit technischer Messungen und Streuungsmasse), G. Sachs. Stahl u. Eisen, vol. 44, no. 32, Aug. 7, 1924, pp. 941-946, 6 figs. Discusses statistical treatment of investigations and their results; frequency curves of numbers of tests.

Stock Control. Control of Stock in Warehouse, D. C. MacInnes. Iron Age, vol. 114, no. 22, Nov. 27, 1924, pp. 1401-1402, 2 figs. Describes system employed by Canadian firm using sheet metals; perpetual inventory maintained, with frequent checks and annual stock taking.

Stockroom Methods. Extreme Variety Versus Standardization, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 129-135, 13 figs. Stockroom methods and stock handling at plant of Gen. Elec. Co. at Schenectady.

Stores Accounting. Balance-of-Stores Accounting System, I. D. Murfield. Elec. Wld., vol. 84, no. 2, July 12, 1924, pp. 66-69, 5 figs. Description of a stores accounting system which has resulted in a reduction of amount of money tied up, also a reduction of stock carried. Maximum and minimum stocks to be carried are specified by utility department heads.

Stores Control. See ORDNANCE, Stores Control.

Stores Management. Modern Management and Booking of Stores (Moderne Lagerführung und -rechnung und die Einheitlichkeit der Vordrucke), H. Reisberg. Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. 989-996, 18 figs. Discusses principles of stores management and gives copies of blank forms used.

Step by Step Details for Obtaining Equipment and Supplies for Maintenance, J. E. Housley. Indus. Engr., vol. 82, no. 4, Apr. 1924, pp. 169-173, 6 figs. Routine followed in an industrial plant for procuring supplies, with methods of storing and accounting for material.

Stores Management in Machine Shops and Costs (Materialverwaltung in Maschinenfabriken unter entsprechender Berücksichtigung der Selbstkostenerfassung), F. Strauch. Maschinenbau, vol. 3, no. 20, July 24, 1924, pp. W151-W153. Discusses management with view to cost reduction and economic use of materials, and to keep track of costs of materials.

The Care and Control of Raw Materials. Factory, vol. 33, no. 1, July 1924, pp. 34-35 and 135-136, 1 fig. Practice at plant of Bausch and Lomb Optical Co.

Stores Methods. See RAILWAY SHOPS, Stores Methods.

Suggestion System. A Suggestion System That Works, K. H. Condit. Am. Mach., vol. 60, no. 25, June 19, 1924, pp. 923-925, 4 figs. Description of system used by the Gilbreths; purpose is to secure from men on job suggestions for improvement in manufacturing methods; useful by-products of system.

Superintendents, Elimination of. Work Without Superintendents, H. R. Simonds. Iron Trade Rev., vol. 74, no. 8, Feb. 21, 1924, pp. 548-550, 9 figs. 52 foremen of Massachusetts plant, employing 3000, are responsible only to general manager; experiment with simplified system proves successful.

Taylor System. See Methods and Principles.

Textile Mills. Significant Savings in Textile Mill Operations, N. T. Thomas. Taylor Soc.—Bul., vol. 9, no. 4, Aug. 1924, pp. 172-176. Results of substitution of scientific management for tradition in Jackson Mills.

Time Sheets, Filling in. Costing and Time-booking, F. A. R. Paton. Engineer, vol. 138, no. 3597, Dec. 5, 1924, pp. 633-634. Notes on correct filling in of employee's time sheet.

Time Study. See TIME STUDY.

Tool Systems. A Well-Planned Tool System. Eng. Production, vol. 7, nos. 143 and 144, Aug. and Sept. 1924, pp. 229-232 and 268-271, 26 figs. Details of comprehensive scheme; discusses tool department, stores, depots, receipt, identification and classification, shortages, issue, replacement, etc.

A Tool-crib System, M. L. O'Flaherty. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 428-430, 5 figs. Proper tool-crib equipment; total classification; checking out tools for production work.

Tool Division Organization and Management, E. C. Cooley. Machy. (N. Y.), vol. 30, no. 9, May 1924, p. 700. Deals with essential points to be considered in developing tool-division system; system successfully employed in number of shops engaged in interchangeable manufacture; making and upkeep of tools; controlling head.

Tractor Plant. Building Tractors Under Scientific Management, Geo. D. Babcock. Mgmt. & Administration, vol. 7, no. 6, and vol. 8, nos. 1, 2, 3, 4, and 5, June, July, Aug., Sept., Oct., and Nov., 1924, pp. 647-652, 19-26, 141-146, 265-270, 377-382 and 497-502, 32 figs. Methods by which Holt Mfg. Co. has made remarkable production record. June: Resuming production after armistice; personnel problems; form of organization. July: Changes in equipment and product preceding installation of production control. Aug.: Organizing personnel for production. Sept.: Establishing material and parts control. Oct.: Putting orders through shop. Nov.: Executive control; formulating sales policy; operation of shop committee.

Waste Elimination. See WASTE ELIMINATION.

Waste Utilization. See WASTE UTILIZATION.

INDUSTRIAL MOBILIZATION

Planning, Engineer's Role in. See MUNITIONS, Manufacturing, Industrial Mobilization for.

Plans, United States. Plans for Industrial Mobilization, L. W. Moffett. Iron Age, vol. 113, no. 10, Mar. 6, 1924, pp. 707-709, 1 fig. Program of U. S. War Department covers allocations, specifications, contracts, etc.; pledge of Iron & Steel Inst.; emergency reserves; procurement planning; control of labor.

INDUSTRIAL ORGANIZATION

Automobile Manufacturing Plant. Organizing a Great Industrial, C. S. Scott. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 523-527, 1 fig. Organization methods of General Motors corporation.

Basic Principles. The Basic Principles of Organization, T. H. Jackson. Military Engr., vol. 16, no. 86, Mar.-Apr. 1924, pp. 95-99. Discusses decentralization, selection of group leaders, policy of command, creation of new groups, appointment of group leaders, specialist command, organizing around leaders, support of group leaders, and excessive overhead.

City Paving Departments. General Organization of City Paving Departments. Engrs. & Eng., vol. 41, nos. 7 and 8, July and Aug., 1924, pp. 194-198 and 215-219. Series of papers relative to administration of city paving departments: Phila., Pa., J. H. Neeson; New York, N. Y., C. M. Pinckney; Baltimore, Md., G. Cobb; Indianapolis, Ind., J. L. Elliott; Waltham, Mass., G. C. Grehm.

Cost Reduction. Organizing a Business for Cost Reduction, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 193-197. Discusses part that cost department should play in general program of company progress.

Economic Problems. Economic Problems of Industrial Organization, Fred. C. Mills. Mgmt. & Administration, vol. 7, nos. 3, 4, and 5, Mar., Apr., and May, 1924, pp. 337-341, 423-426, and 573-576. Mar.: Industrial system and price system, and connection between them; relation between quantity of goods and quantity of money; control of price movements. Apr.: Factors affecting wages and other shares in product of industry. May: Foreign trade in relation to industry.

Executive Control. Organization for Successful Operation, B. A. Franklin. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 513-516. Discusses important requirements to be met, and methods to be followed for upbuilding of smoothly operating and result-getting organization.

Factory, Medium-Size. The Problems of Industrial Organization and Their Solution (Brennende Probleme der Betriebsorganisation und der Weg zu ihrer natürlichen Lösung), Geo. Schlesinger. Schweizerische Bauzeitung, vol. 83, no. 21, May 24, 1924, pp. 243-247, 3 figs. Describes plan, design and equipment of medium-sized factory, employing 150 workmen, constructed and organized by author, as example of economy of scientific organization.

Foundries. Organization and Practice in a Steel Foundry Finishing Department, Chas. W. Heywood. Foundry Trade Jl., vol. 30, no. 426, Oct. 16, 1924, pp. 339-341. Notes on gang system; pace maker; layout of equipment; routing; operations; care of machinery and tools; inspection; cost and wages.

See also FOUNDRIES, Cost Accounting.

Machine Shops. Working Organization of a Machine Shop and Iron Foundry (Betriebsorganisation einer Maschinenfabrik und Eisengiesserei), W. Bischoff. Maschinenbau, vol. 3, no. 13, Apr. 10, 1924, pp. 445-450, 11 figs. Explains inner organization of machine works by means of card system used.

Plan of. Business Organization from a New Viewpoint, E. P. Hyde. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 273-280. Plan of organization is suggested for large business engaged in both manufacture and sale of technical commodity, maintaining technical departments for manufacturing and sales development, and conducting other activities auxiliary to business.

Plant-Maintenance Work. Organizing for Plant Maintenance Work, L. A. Blackburn. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 440-444 and 448, 6 figs. Outlines plan of organization for large manufacturing plant; various departments of such organization, including policing of plant, protection against fire, maintaining plant in sanitary condition, removal of waste material, opertion of power plant, inspection and repairing of motors and metering devices, etc.

Production Factors. The Factors of Production, Fred. C. Mills. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 215-219. Natural resources, capital, labor supply, and organizing ability are indicated as chief factors of production; author analyzes constituent elements of individual business unit and indicates part played by specialization within unit.

Production Organization. Production Organization. Eng. Production, vol. 7, no. 138, Mar. 1924, pp. 74-77. Reasons for organization and methods to be adopted; the ideal organization; laws governing manufacture; procedure in organizing a new factory.

Vertical Trusts. The Vertical Trust, D. T. Farnham. Indus. Mgmt. (N. Y.), vol. 67, no. 5, May 1924, pp. 257-263, 4 figs. Newer form of industrial combination and what it portends; its advantages and limitations and place in present industrial order.

INDUSTRIAL PLANTS

Construction. Esthetics of Engineering Structures (Ueber die Schönheit der Ingenieurbauten), P. Meyer. Schweizerische Bauzeitung, vol. 84, no. 14, Oct. 4, 1924, pp. 163-165, 7 figs., partly on pp. 166-167. Discusses examples of modern artistic plants, such as Zschornewitz power plant, Buffalo grain silo, and gas holders at Treptow and Reick.

Farms for. Farms for Factories. Factory, vol. 32, no. 4, Apr. 1924, pp. 487-488 and 596. Close relation between agricultural and industrial life in Germany; unusual development that has taken place since war.

Location. Economic Factors in Industrial Plant Location, P. F. Walker. Mgmt. & Administration, vol. 8, nos. 3 and 6, Sept. and Dec. 1924, pp. 259-264 and 637-642, 1 fig. Sept.: Discusses influence of country's growth; development of transportation centers; national industrial system; proposals for remedying conditions; results of modified rate structure; effects of present rate structure; factors which influence location; basis for estimating demands; process of organization; importance of products to location; etc. Dec.: Importance of adequate water supply; distribution cost analysis; shifting of industries.

Machine Shops. See MACHINE SHOPS.

Maintenance. Modern Maintenance of Plant and Equipment, Wm. G. Ziegler. Serial article in Indus. Mgt. (N. Y.), beginning vol. 67, no. 2, Feb. 1924, and ending vol. 68, no. 5, Nov. 1924, 53 figs. The plant plumber, pipefitter and tinsmith, and what they mean to production. Carpentry, masonry, and machine repair. Maintaining efficiency of artificial light. Importance of sanitation maintenance from standpoint of production and labor turnover. Maintenance in power plant. Factory heating system. Equipment and maintenance in plant yard.

Painting. See PAINTING, Industrial Plant Practice.

Power-Cost Control. Organizing to Reduce the Cost of Power, J. P. Jordan. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 336-340. Author shows way to mastery of power-cost control by defining and outlining factors involved.

Power Equipment. Present and Future Power Equipment, H. E. Collins. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 617-622, 2 figs. Comparison of prime movers, boilers, and requirements in auxiliaries.

Power-Transmission on Losses. Attacking Power Losses in Transmission and Utilization, T. Croft. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 349-356, 13 figs. How to find sources of waste and how to eliminate them.

Railway Switching Equipment. Modern Switching Equipment for Factory Railways (Ueber moderne Rangiermittel für Werkbahnen), M. Schultz. Glasers Annalen, vol. 95, no. 3, Aug. 1, 1924, pp. 41-46, 13 figs. Details of locomotive driven by gasoline or benzol, with and without capstan; battery locomotives and tractors and their operation.

Railways. Industrial Transportation Over Definite Lines of Travel, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 50-57, 10 figs. Summary of advantages and limitations of industrial railway as a means for efficient handling of materials.

Track Curves (Ueber Gleiskurven), S. Kiehne. Bauingenieur, vol. 5, no. 12, June 30, 1924, pp. 364-365, 7 figs. Discusses action of wheels in passing through curve in track, and describes arrangement by which inner wheel flange runs between two rails and outer wheel flange runs on rail; this arrangement is substitute for turntable, application in Kiel Navy Yard.

Reconstruction. Reconstruction of Water Power Plant of the Silk and Cigarette Paper Factory of Schöller & Hösch [Die Neugestaltung der Wasserkraftanlage der Seiden- und Zigarettenpapierfabrik Schöller & Hösch, Gernsbach (Baden)], H. Mess. Bautechnik, vol. 2, nos. 32 and 34, July 25 and Aug. 8, 1924, pp. 353-355 and 373-375, 9 figs. General layout, details of turbines and turbine house; advantages of new construction.

Shipping Department, Gen. Elec. Co. Extreme Variety Versus Standardization, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 67, no. 5,

May 1924, pp. 303-308, 7 figs. Warehousing and shipping electrical products; practice of the shipping department of Gen. Elec. Co., Schenectady, N. Y.

Substations for, Automatic. See SUBSTATIONS, Automatic.

INDUSTRIAL RELATIONS

Coal Mines. Labor Relations in the Fairmont, West Virginia, Bituminous Coal Field, B. Emmet. U. S. Bur. Labor Statistics—Bul., no. 361, July 1924, 86 pp. Number and nativity of miners; wage rates; policies governing labor relations; non-union collective bargaining.

Coöperative Plans. Best Methods for Bringing About Co-operation, J. C. Clark. Ry. Age, vol. 77, no. 26, Dec. 27, 1924, pp. 1175-1177. Points to necessity of selecting best men available and placing them in organization in positions for which they are best qualified through well-organized employment service; providing personal record system which will show complete and unbiased record of each employee's service; and developing each individual unit through educational work.

New Co-operative Developments on the B. & O. Ry. Age, vol. 76, no. 10, Mar. 8, 1924, pp. 543-545. Program of coöperation between federated shop craft unions and management started a year ago now extended to all shops on system; sharing gains; stabilization of employment; ideas from shopmen.

The Philadelphia Rapid Transit Coöperative Plan—a Critical Survey, D. D. Kennedy. Indus. Mgmt. (N. Y.), vol. 68, no. 6, Dec. 1924, pp. 367-372. What analysis of its provisions shows as regards safeguarding of employee's interests; indication of past events concerning operation of plan; possible dangers of plan.

Economic Courses for Employees. Increased Industrial Acquaintanceship. Iron Age, vol. 113, no. 3, Jan. 17, 1924, pp. 211-214, 5 figs. Progress in 1923 in relations with employees at plant of Bridgeport Brass Co., Bridgeport, Conn.; courses in economics to explain business problems; service club; pensions to superannuated employees; group insurance plan.

Employees-Management Coöperation. Coöperation in Industry, S. Rea. Min. Congress Jl., vol. 10, no. 9, Sept. 1924, pp. 421-423. Enlightened industrial management recognizes need for direct negotiation and mutual understanding. Principles underlying Pennsylvania Railroad System plan of employee-management relationship.

See also RAILWAY OPERATION, Employees-Management Coöperation.

Employees' Publications. Coöperation Through Plant Publications, W. R. R. Winans. Iron Age, vol. 113, no. 9, Feb. 28, 1924, pp. 647-649. Basic principles to be considered in planning such publication, and outline of kind and proper handling of items that will keep it sold.

Employers' Associations. Some Tendencies of Employers' Organizations in 1923. Int. Labour Rev., vol. 9, no. 2, Feb. 1924, pp. 208-226. Outstanding tendencies of employers' associations during 12-month period ending in autumn of 1923.

Group Insurance. See INSURANCE, Group.

Improvement. Industrial Relations, Rob. E. Tally. Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 478-480. Industry created by capital and labor; duties of employer; duties of organization heads and bosses; other factors of influence between employer and employee.

Intra-Plant Relationships. Intra-Plant Relationships and Industrial Leadership, R. H. Booth. Min. & Metallurgy, vol. 5, no. 206, Feb. 1924, pp. 67-71, 4 figs. Describes novel plan for objective presentation of business economics.

Kansas City Rys. Plans. Building Good Employee Relations in Kansas City. Elec. Ry. Jl., vol. 63, no. 2, Jan. 12, 1924, pp. 63-66, 3 figs. Principles and organization plant of employee brotherhood and representation plan which have contributed to present favorable situation in Kansas City; separate committee handles all wage matters; membership in brotherhood entirely voluntary.

Labor Management. What We Think of Industrial Democracy, After 7 Years, W. P. Hapgood. Factory, vol. 33, no. 2, Aug. 1924, pp. 187-189 and 286-290, 2 figs. Experiences of factory council in working its way up through usual worries about wages and hours of work into constructive effort toward bringing business to higher level of efficiency.

Lumber Industry. Industrial Relations in the West Coast Lumber Industry, C. R. Howd. U. S. Bur. Labor Statistics—Bul., no. 349, Dec. 1923, 120 pp., 2 charts. Examination of lumber industry, particularly financial conditions and kind of work men do; technology of industry and demands it makes on employees; hours, rates of wages, and working and living conditions; history of organized or articulate protests of employees and reactions of employers.

Personnel Work. See EMPLOYMENT MANAGEMENT, Service Department.

Progress in. Progress in Industrial Relations, Chas. M. Mills. Iron Age, vol. 113, no. 4, Jan. 24, 1924, pp. 281-283. Important gains made by progressive corporations; employee representation, it is claimed, has accomplished much, but has not been perfected.

Railways. What Railroad Managements Should Do to Secure Co-operation from Their Employees, H. C. Metcalf. Ry. Age, vol. 77, no. 22, Nov. 29, 1924, pp. 982-984. What railway employees think railway management should do; proposals regarding joint relations; demand for personnel program; regularization of employment. See also article by same author entitled, Modern Personnel Administration and Its Application to the Railways, in no. 23, Dec. 6, 1924, pp. 1016-1020, 2 figs.

See also Coöperative Plans.

Welfare Work. See WELFARE WORK.

Works Councils. See EMPLOYEES' REPRESENTATION.

INDUSTRIAL TRUCKS

Combined Passenger and. Railodoks. Elec. Times, vol. 66, no. 1712, Aug. 7, 1924, pp. 159-160, 7 figs. Particulars of vehicle constructed for carrying passengers at British Empire Exhibition; is an electric industrial truck with addition of an inexpensive type of seat and a light canopy; seats are removable when it is desired to return truck to industrial duties.

Efficiency Measurement. Measuring the Efficiency of Shop Trucks, S. M. Lowry. Mgmt. & Administration, vol. 8, no. 3, Sept. 1924, pp. 279-284, 3 figs. Methods used at plant of Westinghouse Elec. & Mfg. Co. at East Pittsburgh, Pa.

Electric. Around the Shop with the "Electric Mule," H. S. Riggs. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 438-441, 9 figs. How transporting of materials from one department of plant to another has been speeded up by use of lift trucks and tractors.

Hand-Lift. Multiplied Manpower and Simplified Handling, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 221-228, 12 figs. Deals with hand lift truck and skid system.

Studies Savings Effected by Trucks. Iron Trade Rev., vol. 74, no. 7, Feb. 14, 1924, pp. 479-481, 4 figs. Possibilities of storage-battery truck service in foundry field investigated by company manufacturing storage-battery trucks.

INERTIA

Moments of. Simple Determination of Moments of Inertia (Einfache Bestimmung von Trägheitsmomenten), Closterhalfen. Maschinenbau, vol. 3, no. 11, Mar. 13, 1924, pp. 361-362, 2 figs. Describes simple method for determination of mass inertia moments.

INJECTORS

Thermal Efficiency. The Thermal Efficiency of an Injector. Sibley Jl. of Eng., vol. 38, no. 1, Jan. 1924, pp. 13-15. Determination of this efficiency.

INLAND WATERWAYS

[See also CANALS; RIVERS; WATERWAYS.]

Diesel-Engined Vessels. See DIESEL ENGINES, Inland-Waterway Vessels.

Transportation. See TRANSPORTATION, St. Lawrence and Hudson Bay Projects.

INSPECTION

Factory. See FACTORIES, Inspection.

Industrial. Inspection. Int. Labour Rev., vol. 10, no. 4, Oct. 1924, pp. 665-685. Factory inspection in Great Britain in 1923. Industrial inspection in Austria in 1922.

Methods. Inspection Methods Symposium. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 437-439 and 466. Gives abstracts of three papers, by A. H. Frauenthal, C. S. Stark, and C. J. Jones, respectively, followed by discussion.

INSTRUMENTS

Design and Construction. Instrument and Apparatus Manufacture and Machine Construction (Feinmechanik und Maschinenbau), O. Richter. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 42, Oct. 18, 1924, pp. 1089-1092, 33 figs. Using as an example the parts of a telephone apparatus, it is shown that construction of instruments and apparatus deviates so widely from machine building that present-day machine-building practice does not suffice for design and construction of such complicated apparatus.

INSULATING MATERIALS, ELECTRIC

Application. Insulating Materials and Their Use in Electro-Technic Industries (Die Isoliermaterialien und ihre Verwendung in der Elektrotechnik), E. J. Staemmler. Elektrotechnische Zeit., special no., Aug. 28, 1924, pp. 11-12. Discusses principal materials and their special uses, including porcelain, marble, slate, asbestos, mica, paper, rubber, caseine products, etc.

Bakelite. See BAKELITE.

Boards and Moldings. Directions for the Study of Non-Ignitable and Self-extinguishing Boards and Mouldings for Electrical Purposes. Instn. Elec. Engrs.—Jl., vol. 63, no. 336, Dec. 1924, pp. 51-59, 11 figs. Definitions and classifications; methods of tests.

Breakdown Strength. Methods and Apparatus for the Determination of Breakdown Strength of Electric Insulating Materials (Methoden und Apparate zur Ermittlung der Durchschlagspannung von flüssigen und von vergiessbaren elektrischen Isolierstoffen), R. Dieterle. Elektrotechnische Zeit., vol. 45, no. 21, May 22, 1924, pp. 513-518, 9 figs. Discusses testing of fluid materials and materials capable of being molded to determine electric breakdown; describes new test apparatus used, and gives conclusions regarding distance between electrodes and properties of electrodes.

Dielectric Hysteresis Losses. On the Theory of Dielectric Hysteresis Loss in Fibrous Insulating Materials, Y. Toriyama. Denki Gakkwai Zasshi (Inst. Elec. Engrs. of Japan—Jl., no. 428, Mar. 1924, pp. 227-235, 6 figs. Discusses leakage in dried fibrous insulating material and losses due to discharge through leakage path in a.c. field. (In Japanese.)

Dielectric Strength. Dielectric Strength of Insulation, V. M. Montsinger. Elec. Wld., vol. 84, no. 14, Oct. 4, 1924, pp. 723-727, 19 figs. Describes determination of influence exerted by time and frequency tests made on individual insulation materials for transformers.

Electrical Machinery. Insulation of Electrical Apparatus, A. P. M. Fleming. Electrician, vol. 92, no. 2402, May 30, 1924, pp. 656-657, 1 fig. Trend of its development; some striking changes; influence of ventilation.

Evaluation. Evaluation of Insulating Materials, L. E. Barringer. Elec. Wld., vol. 84, no. 18, Nov. 1, 1924, pp. 950-952, 10 figs. Difficulty encountered in formulation of tables of properties that can be used for comparisons; uniform testing methods being used that will standardize practice.

Lonarite. See LONARITE.

Mica. Disruptive Strength of Mica for 50-Period Alternating Current (Ueber die Durchschlagsfestigkeit verschiedener Glimmersorten bei 50-periodigem Wechselstrom), F. Grünewald. Ecktrotechnische Zeit., vol. 45, no. 41, Oct. 9, 1924, pp. 1084-1086, 11 figs. Author finds that by expelling air between plate electrodes and tested mica sheet with aniline oil having dielectric constant of 7, very marked differences can be found between various mica qualities; his experience has shown that frequently observed red spots in mica are not detrimental electrically, but black, needle-shaped inclosures usually cause punctures.

Mica and Micanite Insulation, A. A. C. Dickson. Elec. Rev., vol. 94, no. 2423, May 2, 1924, pp. 688-691, 1 fig., and vol. 95, nos. 2439 and 2440, Aug. 22 and 29, 1924, pp. 276-278, and 312-313. May 2: Specifications and their interpretation; essential simple analyses and technical tests of mica to ascertain its suitability for use for which it is required. Aug. 22 and 29: Discusses Brown moulding micanite, flexible micanite, mica cloth and mica paper, mica folium, silk, tubes, vee rings and mica and micanite washers.

Paper, Bakelized. High-Tension Insulating Materials of Hard Paper (Hochspannungs-Isolationen aus Hartpapier), W. Demuth. Elektrotechnische Zeit., vol. 45, no. 25, June 19, 1924, pp. 646-649, 5 figs. Discusses insulating materials of bakelized hard papers from viewpoint of engineer and manufacturer.

Puncture Test. Mathematical Theories of Puncture of Solid Insulating Materials (Mathematische Theorien für den Durchschlag fester Isoliermaterialien), L. Dreyfus. Schweiz. Elektrotechnische Verein Bul., vol. 15, no. 7, July 1924, pp. 321-344, 14 figs. Discusses various explanations of puncture and shows how to resolve analytically and graphically heat transmission problems in plane and cylindrical bodies. Shows application of his method of calculation to construction of internally and externally cooled insulators.

Radiotelegraphic, Dielectric Losses in. Dielectric Losses in Insulating Materials Used in Radio-Telegraphic Construction (Pertes diélectriques dans les isolants utilisés pour la construction

radioélectrique), P. Bouvier. Radioélectricité, vol. 5, no. 51, Jan. 10, 1924, pp. 1-4 (Bul. Technique), 2 figs. Survey of problem of insulation design at radio frequencies, discussion being based on results recorded by Mesny and by Hoch in reports to Union des Syndicats de l'Electricité.

Solid, Breakdown of. Mathematical Theories for the Breakdown of Solid Insulating Materials (Matematiska teorier för genomslaget hos fasta isolationsmaterial), L. Dreyfus. Teknisk Tidskrift, vol. 54, nos. 9, 18, 40, and 44, Mar. 1, May 3, Oct. 4, and Nov. 1, 1924, pp. 54-56, 89-95, 174-178, and 195-199 (Elektroteknik), 25 figs. Extensive discussion of mathematical theory for following method of explaining breakdown of solid insulating material: By conceiving phenomenon as a purely electrical one. This defines breakdown as a dissolution of molecular structure. Dielectric strength is then given in terms of field strength. Discusses different methods of testing insulation materials.

Standardization. The Importance of Standards in the Evaluation of Insulating Materials, L. E. Barringer. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 736-741, 11 figs. Demonstrates great difficulty of evaluating insulating materials from data usually available or furnished by manufactures; ultimate solution of problem is standardization of methods for testing insulating materials.

Testing. Disruptive Field Strength, Initial and Sparking Voltage With Alternating Current of 500 periods per sec (Ueber Durchbruchfeldstärke, Anfangsspannung und Funkenspannung bei Wechselstrom von 500 Per/sec.), F. Müller. Archiv für Elektrotechnik, vol. 13, no. 16, Sept. 30, 1924, pp. 478-506, 22 figs. Determination of disruptive field strength of air, using plane and spherical electrodes; discharge field strength of sphere of conducting and dielectric material; sparking voltage of point electrodes in dependence of distance of electrodes, moisture, temperature and pressure.

Varnish Paper. Directions for the Study of Varnish-Paper and Varnish-Fabric Boards and Tubes. Instn. Elec. Engrs.—Jl., vol. 62, no. 326, Feb. 1924, pp. 160-172, 10 figs. Definitions and classification; methods of test. Report from Brit. Elec. & Allied Industries Research Assn. See also report, entitled, Directions for the Study of Varnished Cotton Cloth (excluding Adhesive Tape), pp. 173-177, 2 figs.

Varnishes, Paints and Compounds. Directions for the Study of Electrical Insulating Varnishes, Paints and Enamel Paints. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 936-940. Report received from Brit. Elec. & Allied Industries Research Assn.

Insulators and Insulating Materials. World Power, vol. 1, no. 3, Mar. 1924, pp. 181-184, 2 figs. Properties which ideal insulator should possess; Ebonestor insulators; insulating varnishes and compounds; testing enamels and varnishes.

See also VARNISHES, Insulating.

INSULATING MATERIALS, HEAT

Pipe Coverings. See PIPE COVERINGS.

INSULATION

Electric. See INSULATION, ELECTRIC.

Heat. See INSULATION, HEAT.

INSULATION, ELECTRIC

Armatures. Gaseous Ionization in Built-up Insulation, J. B. Whitehead. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 19-25, 5 figs. Continuation of tests described in previous paper, extending to wider range of type of armature insulation; results.

High-Voltage. High-Voltage Insulation, J. L. R. Hayden and Chas. P. Steinmetz. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 36-43, 2 figs. Notes on air as dielectric; liquid and solid dielectrics; mechanism of thermal breakdown of dielectric as third-class conductor; mechanism of disruption due to mechanical instability and by chemical deterioration; ionization; time lag of insulation. (Abridged.)

Mica and Micanite. See MICA, Insulation.

INSULATION, HEAT

Air Spaces. The Heat Insulating Capacity of Air Spaces (Die Isolierfähigkeit von Luftschichten nach neueren Forschungen), H. Hamester. Wärme- und Kälte- Technik, vol. 26, no. 8, Apr. 30, 1924, pp. 64-66. Modern investigations covering conduction connection and radiation of heat through air spaces are reported.

Buildings. Insulation and Heating Possibilities in Buildings, Jas. Govan. Eng. Jl., vol. 7, no. 5, May 1924, pp. 231-241, 5 figs. Results of observations and investigations of advantages of proper insulation of buildings.

Diatomaceous-Earth Brick. The Manufacture of an Insulating Brick from Diatomaceous Earth, C. A. Smith. Am. Ceramic Soc.—Jl., vol. 7, no. 1, Jan. 1924, pp. 52-60, 9 figs. Pulverized diatomaceous earth was blended with each of the four clays, Tennessee ball, Bedford shale, Rock Hill, Tionesta, in percentages of 0, 5, 10, 15, 20, 30, 50 clay; dry pressed briquets were made, using 50 to 60 per cent water, and were burned at cones 06, 02, and 2; heat conductivity tests made upon best bodies of series.

Roofs. The Insulation of Roofs to Prevent Heat Loss and Condensation, W. L. Miller. Heat. & Vent. Mag., vol. 21, no. 11, Nov. 1924, pp. 45-49 and 61, 1 fig. With notes showing how to figure this work and savings made possible when effective insulation is applied. Tables giving coefficients and overall resistance of uninsulated roofs (air to air), and thermal internal (not air to air) conductivity and resistance of materials used in roof construction.

Tests. Insulation, G. A. Young and E. F. Burton. Refrig. Eng., vol. 10, no. 9, Mar. 1924, pp. 345-348. Properties of low-temperature insulating materials; types of insulation; unit of heat flow, facilities for insulation tests at Purdue University; Master Car Bldrs.' Assn. and Bur. of Standards model electric calorimeters.

INSULATORS, ELECTRIC

[See also CERAMIC MATERIALS, Dielectric-Constant Determination.]

Combined. Combined Suspended and Catenary Insulators (Kombinierte Hänge-Isolatorenketten), Altmann. Elektro-Jl., vol. 4, no. 8, Aug. 1924, pp. 220-222, 4 figs. New combined insulator by Schwaiger and results of tests carried out.

Condensers. See CONDENSERS, ELECTRIC, Insulating Materials and.

Dielectrics. See DIELECTRICS.

Disk-Type. The V-Type Insulator (Der V-Isolator), W. Weicker. Elektrotechnische Zeit., vol. 45, no. 18, May 1, 1924, pp. 432-434, 6 figs. Describes disk-type chain insulator developed by A. Vaupel, and gives results of tests showing electrical and mechanical behavior of insulator.

Disruptive Strength. Disruptive Strength of Solid Insulators (Der Durchschlag fester Isolatoren), W. Rogowski. Archiv für Elektrotechnik, vol. 13, no. 2, May 31, 1924, pp. 153-174, 12 figs. Discusses recent interpretation of puncture as mere heat phenomenon favored by lack of homogeneity in insulating material (in form of strings) as advanced by Wagner, Steinmetz, and others.

Impact, Arcing and Disruptive Voltage in Insulators (Stossspannung, Ueberschlag und Durchschlag bei Isolatoren), M. Toepler. Elektrotechnische Zeit., vol. 45, no. 40, Oct. 2, 1924, pp. 1045-1050, 9 figs. Discusses tests with impact or shock voltage, effect of capacity and air pressure, and calculation of loads.

Thermo-Electric Equilibrium in Solid Insulators (Über das thermisch-elektrische Gleichgewicht in festen Isolatoren), T. Kármán. Archiv für Elektrotechnik, vol. 13, no. 2, May 31, 1924, pp. 174-180, 2 figs. Discusses disruptive tension of insulators, criticizing Wagner's idea that puncture is heat phenomenon.

High-Tension. Five Years Operating Experience with High-Tension Insulators in the Power Transmission Line Untra-Stockholm (Betriebserfahrungen mit Hochspannungs-Isolatoren an der Kraftleitung Untra-Stockholm nach zirka fünfjährigem Betrieb), K. J. Laurell. Elektro-Journal, vol. 4, no. 3, Mar. 1924, pp. 76-82, 7 figs. Operation of this 100,000-volt line has been very satisfactory, with only three interruptions due to faulty insulators. Inspection of line was carried out partly according to spark gap method, while line was in service, and partly according to resistance method when line was disconnected.

High Voltage Insulators, A. Collins. Electrician, vol. 93, no. 2422, Oct. 17, 1924, pp. 438-439, 3 figs. Draws attention to bearing of time-voltage characteristic upon factor of safety of insulation of electric plant and describes method employed by Micanite & Insulators Co. in carrying out commercial tests on high-voltage insulators.

High-Voltage Pin-Type Insulator (Der Weitschirmisolator, ein neuer Hochspannungs-Freileitungsisolator), W. Weicker. Elektrotechnische Zeit., vol. 45, no. 9, Feb. 28, 1924, p. 155, 3 figs. New insulator of pin type developed by one of leading German porcelain factories for voltages between 6000 and 80,000; insulator model is made up on one, two, or three parts cemented together, number depending on voltage; top part is unusually large in diameter and resembles shallow umbrella; points out advantages of new insulator.

The Application of High-Tension Insulators, T. B. Fleming. Elec. Jl., vol. 21, no. 5, May 1924, pp. 217-218, 2 figs. It is shown that one-half wet flashover of either suspension string or pin-type insulator can be taken as working voltage under average conditions; locality must be studied and graded in order to determine amount of insulation required either below or above base line of one-half flashover; insulation above actual requirements is good practice.

Transmission Lines Mounted on Insulator Chains (Lignes de transmission d'énergie montées sur chaînes d'isolateurs), H. Carpentier. Revue Générale de l'Electricité, vol. 16, nos. 8 and 9, Aug. 23 and 30, 1924, pp. 303-311 and 352-356, 12 figs. Discusses necessity for studying mechanical equilibrium of projected lines; tension of conductors in adjacent spans; rupture of conductors; methods of calculation.

See also Suspension; Uniting Parts with Hemp.

Improvements. Improvements in Insulators, E. Rosenthal. Elec. World, vol. 83, no. 12, Mar. 22, 1924, pp. 575-576, 7 figs. Breakdowns obviated by employing binder which fills all pores and renders cemented joints impervious to moisture.

Liquid. The Theory of Electrostriction in Liquid Insulators (Sur la théorie de l'électrostriction dans les liquides isolants), G. Bruhat and M. Pauthenier. Académie des Sciences—Comptes Rendus, vol. 179, no. 22, Dec. 1, 1924, pp. 1257-1260. Discusses contraction of liquid between two armatures on establishing field and makes calculations of effects of electric field for a given pressure and temperature.

Manufacture. Manufacture of High-Voltage Insulators, M. H. Hunt. Chem. & Met. Eng., vol. 31, no. 19, Nov. 10, 1924, pp. 728-733, 10 figs. Brief exposition on raw material and processes of insulator manufacture, with particular reference to operations at Westinghouse Company's plant at Emergyville, Cal.

The Manufacture, Development and Testing of High-Tension Insulators. Eng. Progress, vol. 5, no. 1, Jan. 1924, pp. 5-8, 10 figs. Manufacturing process; tunnel furnace which is newest type of baking furnace for ceramic industry; testing of insulators.

1,000,000-Volt Testing Room for. The First European Testing Room for Alternating Current of 1 Million Volts Pressure. Eng. Progress, vol. 5, no. 5, May 1924, pp. 93-95, 8 figs. Reasons for building testing room, which is intended to ascertain quality of suspension, pin-type and leading-in insulators, etc.; building and mechanical equipment; transformer plants; erected at porcelain works in Freiberg (Saxony) of Hermsdorf-Schomburg Insulator Co.

Plates. The Influence of Support upon Surface-Resistance Measurements (Der Einfluss der Unterlage bei der Messung des Oberflächenwiderstandes von Isolierplatten), R. Dieterle. Elektrotechnische Zeit., vol. 45, no. 8, Feb. 21, 1924, pp. 132-133, 2 figs. When determining ohmic creepage resistance on surface of insulating plates, nature of support upon which plate rests during test is in certain cases of considerable importance; if insulating material has very large resistance, support has practically no influence, even for very thin plates; for material of lower dielectric strength, measurement made on plate resting on grounded support will give much too high value and will be misleading.

Porcelain. Cementing of Porcelain Insulators (Die Lösung des Kittproblems im Isolatorenbau), E. Rosenthal. Elektrotechnische Zeit., vol. 45, no. 15, Apr. 10, 1924, pp. 333-334, 5 figs. Cementing material has been found which does not expand in setting and which, after accelerated setting process, is non-porous; numerous practical tests have demonstrated that insulators cemented in described way are mechanically stronger than those cemented in accordance with older methods.

Insulators Cemented with Permanit (Permanitgekittete Isolatoren), A. Bültemann. Elektrotechnische Zeit., vol. 45, no. 39, Sept. 25, 1924, pp. 1026-1027. Permanit process is intended to obviate cracking of insulators, which often results from use of ordinary cement; it is said to have worked well in practice, and consists in adding cement to molten pitch, which is then further heated till uniform mixture results; technical examination of results obtained with ordinary cement as compared with Permanit process.

Manufacture of Porcelain Insulators in France (La frabrication en France des isolateurs en porcelaine). Technique Moderne, vol. 16, no. 18, Sept. 15, 1924, pp. 616-619, 4 figs. Discusses raw materials, preparation of porcelain paste, forming, drying, enameling, backing, etc.; control of finished product.

Measuring Current Flow in Porcelain Insulators. Elec. World, vol. 83, no. 6, Feb. 9, 1924, pp. 282-284, 4 figs. Use of thermojunction gives readings of high sensitivity; values checked within limits of accuracy in testing additional units of same type.

Suspension. A New 110,000-Volt Suspension Insulator. Elec. World, vol. 83, no. 24, June 14, 1924, pp. 1229-1230, 3 figs. Single-unit suspension insulator of radical design proposed for high-tension service; details of development and of unit and comments of engineers at A. I. E. E. meeting.

A Suspension Insulator for High-Voltage Systems, D. F. Miner. Elec. Jl., vol. 21, no. 12, Dec.

1924, pp. 560-564, 15 figs. Describes development resulting from work of Prof. H. B. Smith of Worcester Polytechnic Inst.; progress of work and application of insulator.

Combined Suspension Insulator Chains (Kombinierte Hänge-Isolatorenketten), E. Marx. Elektro-Journal, vol. 4, no. 10, Oct. 1924, pp. 280-282, 2 figs. Describes tests of insulator chains consisting of various types of insulators, with Hewlett type at top and motor type at bottom.

Comparative Tests on Suspension Insulators (Essais comparatifs sur des isolateurs de suspension), P. Perrochet and B. Jobin. Schweiz. Elektrotechnischer Verein—Bul. (Assn. Suisse des Electriciens), vol. 15, no. 11, Nov. 1924, pp. 537-550, 2 figs. With view of standardizing one type from the many available suspension-type insulators obtainable in market, Federal Swiss Elec. Soc., in collaboration with Zurich Univ., conducted elaborate tests on large number of insulators; tests comprised dry and wet flashover voltage, puncture voltage under oil, mechanical strength and influence of rapid temperature changes.

Pressed Metal Armatures for Suspension Insulators for Aerial Lines (Freileitungs-Armaturen aus Pressmetall für Hänge-Isolatoren), M. Bucov. Elektrotechnik u. Maschinenbau, vol. 42, no. 31, Aug. 3, 1924, pp. 480-483, 17 figs. Discusses new AEG equipment and its advantages.

Properties of the Motor Insulator (Ueber die Eigenschaften des Motor-Isolators), F. Dahl. Elektrotechnik u. Maschinenbau, vol. 42, no. 23, June 8, 1924, pp. 361-366, 20 figs. Describes new double-hood insulator developed by Motor-Columbus Corpn., Baden, Switzerland, which has given satisfactory results in experiment and practice.

Sphere-Head Chain-Type Insulator (Neuer Hängeisolator mit kittloser Bolzenarmatur), M. Carolus. Elektrischer Betrieb, vol. 22, no. 4, Feb. 24, 1924, pp. 29-31, 11 figs. Differing from designs that contain within hollow part of sphere number of loose pieces which have to be assembled and securely locked in place, this insulator requires only one annular ring in head; button-shaped type of inserted bolt deforms this ring into conical shape, thus preventing removal of bolt from insulator.

Suspension Insulators for Overhead Transmission Lines of Industrial Railways (Hängeisolatoren für Fahrleitungen von Industriebahnen), F. Bielefeld. Elektrotechnische Zeit., vol. 45, no. 1, Jan. 3, 1924, pp. 6-8, 6 figs. Describes two German patented types.

The Development of a Suspension-Type Insulator, H. B. Smith. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 689-696, 27 figs. Outlines conditions under which suspension-type insulator has been developed experimentally for long distance transmission conditions of 110,000- and 220,000-volt power lines.

Testing. Checking Insulator Field Tests in the Laboratory, C. L. Kasson. Elec. Wld., vol. 84, no. 4, July 26, 1924, pp. 167-169, 2 figs. Describes methods of making resistance, flashover, and puncture tests.

Detecting Defective Insulators, C. E. Bennett. Elec. World, vol. 83, no. 15, Apr. 12, 1924, pp. 711-715, 7 figs. Advantages of instrument called aislometer which is used on live lines for locating bad units; results of tests and operating experiences; description of device used.

High-Frequency Testing of Line Insulators (Appareillage pour essais en haute fréquence des isolateurs de lignes à haute tension), Saget. Société Française des Electriciens—Bul., vol. 14, no. 35, May 1924, pp. 367-376, 6 figs. Convenient method of carrying out high-tension tests of porcelain line insulators is by means of apparatus producing trains of high-tension high-frequency oscillations, instead of large and expensive transformer; describes apparatus used and its principles of action, and shows that short trains of oscillations thus produced are more suited to purpose than continuous oscillations.

Insulator Testing Methods and Devices, L. A. Wildman. Elec. Light & Power, vol. 2, no. 11, Nov. 1924, pp. 17-20 and 66, 7 figs. Methods of testing on line; oscillator testing set; bush phase set as means of locating leaky insulators on line; telephonic non-insulated method testing pin-type insulators; buzz-stick method; Aislometer method, etc.

Testing Room of the Manufactures Isalatori Vetro di Acqui Co. (La sala prova della Manifattura Isolatori Vetro di Acqui), G. Arigo. Elettrotecnica, vol. 11, no. 15, May 25, 1924, pp. 344-346, 2 figs. Details of tests of vitreous insulators of Acqui Co., including methods and equipment.

Tests of Insulators in Use (Prova degli isolatori in esercizio col "fioretto acustico"), G. Venturini. Elettrotecnica, vol. 11, no. 3, Jan. 25, 1924, pp. 45-48, 5 figs. Results of tests of insulators on high-tension lines during normal use by means of apparatus ("fioretto acustico") devised by C. Tofani, of Florence.

Trials to Test Insulators by Means of Tension Impulses (Versuche über die Prüfung von Isolatoren mit Spannungsstössen), E. Marx. Elektrotechnische Zeit., vol. 45, no. 25, June 19, 1924, pp. 652-654, 6 figs. Discusses testing by means of impulses, giving suitable connection; effect of impulses on insulators, and of strength of testing voltage on precision of test.

Testing Laboratory. See LABORATORIES, Electric-Insulator Testing.

Testing Station. See HIGH VOLTAGES, 1,000,000-Volt Testing Station.

Theory. See ELECTRICAL CONDUCTORS, Theory.

Tubes, Manufacture. Manufacture of Insulating Tubes for Electric Installations (La fabrication des tubes isolants pour installations électriques). Industries Mécaniques, vol. 7, no. 6, Sept. 1924, pp. 221-228, 17 figs. Details of manufacture of tubes for containing wires carrying current consisting of impregnated paper tube covered by metal tube of steel, lead, aluminum, etc.

Types. See INSULATING MATERIALS, ELECTRIC, Varnishes and Compounds.

Uniting Parts with Hemp. Use of Hemp in Uniting High-Voltage Insulators (Hochspannungsisolatoren zusammengehafter Ausführung), W. Weicker. Elektrotechnische Zeit., special spring no., 1924, pp. 22-23, 5 figs. Old method in which hemp was used in uniting parts has been improved, and its use is recommended; three-part insulators assembled in described way have given good service on lines between 40 and 60 kv.; advantage and economy of insulators assembled in this way is possibility of renewing broken petticoat without scrapping undamaged parts.

Voltage Distribution. Voltage Distribution in Chains of Suspension Isolators (Ueber die Spannungsverteilung an Ketten von Hängeisolatoren), A. Salessky. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 58-66, 11 figs. Recommends method of calculating voltage distribution, which gives values which agree well with experimental results and permits calculation of voltage distribution for chains with any number of links of a given insulator type, by aid of two parameters which can be easily calculated.

INSULATORS, HEAT

Brick. A Heat Insulator and Filter Aid. Chem. & Met. Eng., vol. 31, no. 25, Dec. 22, 1924, pp. 972-974, 5 figs. Plant in Whitehills, Cali-

maintained by Celite Products Co., for manufacture of insulating brick and powder used as filter aid, mineral filler and as delicate abrasive.

Heat Losses Through. Heat Losses Through Insulating Materials, R. H. Heilman. Mech. Eng., vol. 46, no. 10, Oct. 1924, pp. 593-602 and (discussion) 602-606, 18 figs. A rational method for their determination by means of conductivity coefficients of materials. Results of 94 tests on commercial pipe coverings and insulating cements conducted at Mellon Inst. Indus. Research of Univ. of Pittsburgh. Describes experimental methods. Discusses from a physical and mathematical standpoint exact character of thermal conductivity and its relation to temperature gradients and differences.

High-Temperature. See FURNACES, INDUSTRIAL, Insulation, High-Temperature.

Slag Wool. Slag Wool as a Building Insulator. Sheet Metal Worker, vol. 15, no. 23, Dec. 5, 1924, pp. 861-862, 2 figs. Results of tests made by Bur. of Standards; recent tests in Norway.

Steam-Pipe. Removable Insulating Covers (Manchons calorifuges amovibles), H. and L. Faron. Revue Industrielle, vol. 54, no. 2181, Aug. 1924, pp. 233-235, 8 figs. Details of patented removable sectional insulation or insulating jackets, their composition, making of joints and advantages.

See also STEAM PIPES, Coverings, Heat Loss Through.

INSURANCE

Accident, Miners'. See ACCIDENTS, Mines and Quarries.

Group. Group Insurance as a Factor in Industrial Relations, Wm. F. Chamberlin. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 149-150. Plans of group life insurance which have been found to be practical; formula in use by two or three well-known concerns.

Group Life Insurance on Twenty-seven Railroads. Ry. Age, vol. 76, no. 18, Apr. 5, 1924, pp. 881-883. List of roads on which such insurance is in force; with notes on differences in details.

When Sickness Stops Wages, What? Wm. B. Bailey. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 31-33. Survey of 2000 families to whom insurance company paid group accident sickness benefits.

See also Social.

Social. Financial Systems in Social Insurance, J. Ferdinand-Dreyfus. Int. Labour Rev., vol. 10, no. 4, Oct. 1924, pp. 583-606. Insurance against short illnesses; birth and maternity insurances; industrial-accident insurance; old-age insurance; invalidity insurance; life insurance for survivors; unemployment insurance.

Social Insurance in Sweden, E. Liedstrand. Int. Labour Rev., vol. 9, no. 2, Feb. 1924, pp. 177-195. Account of most important provisions of existing legislation; analysis of two schemes drawn up by Social Insurance Commission, one for sickness and maternity insurance, other for public employment exchanges and unemployment funds; statistics for different forms of insurance in recent years.

The Burdens of the German Social Insurance (Die Lasten der deutschen Sozialversicherung), O. Heinemann. Stahl u. Eisen, vol. 44, no. 52, Dec. 25, 1924, pp. 1772-1775. Deals with health insurance, old-age pension, employee insurance, accident and unemployment insurance; state aid to disablement insurance (or old-age pension). Reply to publication of State Labor Department in Reichsarbeitsblatt (State Labor Jl.).

The Financial Resources of Social Insurance, H. Korkisch. Int. Labour Rev., vol. 10, no. 6, Dec. 1924, pp. 909-934. Discusses raising of necessary funds and division of cost between state, employer, and worker, arguments for and against system of uniform contributions or of scales graduated either according to actual earnings or to system of wage classes, and methods of collecting contributions; after examining solutions of problems adopted in laws of different countries, author is of opinion that cost of social insurance is in last analysis borne by production, and that it must therefore be entered as item in costs of production.

Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 18, no. 1, Jan. 1924, pp. 157-161. Group-insurance plan of So. Pac. Co.; Franco-Belgian and Franco-Luxemburg conventions relating to social insurance.

Unemployment. See UNEMPLOYMENT INSURANCE.

Workmen's Compensation and. Workmen's Compensation, Health and Accident Insurance in the German State Railway since the Year 1920 (Die Arbeiterpensionskassen, die Krankenkassen und die Unfallversicherung bei der Deutschen Reichsbahn seit dem Jahre 1920), O. Kuhatscheck. Archiv für Eisenbahnwesen, no. 1, Jan.-Feb. 1924, pp. 44-63. Conditions and results of health, accident and invalidity insurance since 1920.

INTEGRATION

Graphic Methods. Graphic Integration Methods (Graphische Integrationsmethoden), C. Runge. Zeit. für Technische Physik, vol. 5, no. 5, 1924, pp. 161-165, 6 figs. Discusses linear and quadratic interpolation, calculation of values of whole functions, graphic integration and differential of curves, graphic integration of linear differential equations of first order.

INTEGRATORS

Diagraph. The Motion Diagraph (Der Fahrdiagraph), Knorr. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 16, Nov. 30, 1924, pp. 353-358, 3 figs. A new type of integrator for integrating general differential equations and solving mechanically numerous important problems, such as determining course of temperature in electric motors.

Mechanical. Carrying Out Technical Integration by Means of a New Mechanical Integrator (Die Ausführung technischer Integrationen auf mechanischem Wege mit einem neuen Integraphen), U. Knorr. Elektrotechnische Zeit., vol. 45, no. 33, Aug. 14, 1924, pp. 869-870, 4 figs. Describes new integrator by means of which mechanical integration of differential equations of higher order is carried out.

INTERCHANGEABLE MANUFACTURE

Automobiles. See AUTOMOBILES, Interchangeable Manufacture.

Maintaining Interchangeability. Maintaining Interchangeability. Am. Mach., vol. 60, no. 10, Mar. 6, 1924, pp. 349-350. Cases that would defeat interchangeability. (Abstract.) Address before Cleveland Eng. Soc.

Munitions. Interchangeable Manufacture and Munitions, E. Buckingham. Army Ordnance, vol. 4, no. 24, May-June 1924, pp. 361-366, 1 fig. Traces briefly progress of a commodity through all stages of its manufacture, from its inception as a mechanical project to final testing that determines its successful completion.

Weighing Machines. Example of Production of Interchangeable Parts (Beispiel für die vorbereitende Arbeit zur Erzeugung austauschbarer Teile), A. Klose. Sparwirtschaft, no. 13-14, July 1924, pp. 65-71 (AWB), 12 figs. Discusses successive processes carried out on predetermined lines, tolerances, marking of parts, etc.

INTERFEROMETERS

Calibrating Standards of Length. Interferometers for Calibrating Standards of Length. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 491-492, 2 figs. Describes apparatus made by Adam Hilger, Ltd., by which accurate standards of length can be originated; apparatus was ordered by Japanese Government because meter has been adopted as sole legal standard of length, and authorities wished to have apparatus by which residual error in existing international standard could be accurately measured, and other standards produced.

Iron-Arc Spectrum Measurements. Interferometer Measurements of the Longer Waves in the Iron Arc Spectrum, W. F. Meggers and C. C. Kiess. U. S. Bur. Standards—Scientific Papers, no. 479, Jan. 5, 1924, pp. 273-280, 1 fig. New values obtained for 161 lines ranging in wavelength from 5534.525 A to 8824.238 A, using international iron arc as a source of secondary standards and cadmium vapor lamps similar to those used in wavelength-meter comparisons for primary standard.

Koesters'. See GAGES, Construction.

Lummer-Gehrcke Parallel-Plate. The Lummer-Gehrcke Parallel Plate Interferometer, F. Simeon. Jl. Sci. Instruments, vol. 1, no. 10, July 1924, pp. 296-304, 3 figs. Gives simple approximate expressions for order of spectrum, separation of consecutive orders, dispersion, and resolving power, together with notes on methods of use, appearances obtained and interpretation of these appearances. Precautions to be observed in order to obtain finest definition. Bibliography.

Measurement of Density of Gases. Density and Diffusion of Gases Measured by Displacement Interferometry, C. Barus. Nat. Acad. Sci.—Proc., vol. 10, no. 4, Apr. 1924, pp. 153-155, 1 fig. Method is said to be very simple and expeditious, and should give results well within one per cent.

INTERNAL-COMBUSTION ENGINES

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; GASOLINE ENGINES; IGNITION; MOTOR BUSES, Engines; MOTOR TRUCKS, Engines; OIL ENGINES; SEMI-DIESEL ENGINES.]

Applications. Present Applications of Internal-Combustion Engines (Les applications actuelles des moteurs à combustion interne), A. Witz. Technique Moderne, vol. 16, no. 15, Aug. 1, 1924, pp. 501-509, 5 figs. Discusses use of engines up to 100 hp. in small industries, and up to 2300 hp. in medium- and large-scale industries; fuels; types of engines; engines for central stations, for metallurgy, for traction and driving airplanes.

Balancing of Masses. Balancing of Masses in Single-Crank, Single- and Double-Cylinder Internal-Combustion Engines (Massenausgleich bei einkurbeligen ein- und zweizylindrigen Verbrennungsmotoren), H. Schrön. Motorwagen, vol. 27, nos. 8 and 10, Mar. 20 and Apr. 10, 1924, pp. 127-134 and 166-174, 35 figs. Numerical and graphical presentation of paths of center of gravity, free forces and movements exerted by masses, with one cylinder and two cylinders in fork and end-to-end arrangement, when no counterweight is present and when rotating masses are balanced; determination of additional weight for further improvement of weight; numerical examples.

Bearing Pressures. Calculation of Bearing Pressures in High-Speed Explosion Engines (Il calcolo delle pressioni sui cuscinetti nei motori a scoppio a grand velocità), S. R. Treves. Industria, vol. 38, no. 19, Oct. 15, 1924, pp. 521-529, 14 figs. Develops construction of polar diagrams for various types of engines and gives detailed application to Fiat engine as an example.

British Empire Exhibition. Internal Combustion Engines at the British Empire Exposition, J. B. C. Kershaw. Power, vol. 60, no. 5, July 29, 1924, pp. 168-170, 6 figs. Describes different types exhibited.

Internal Combustion Engines Exhibited in the Palace of Engineering (British Empire Exhibition). Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 529-534, 21 figs., partly on supp. plate. Details of exhibits.

Catalysis Applied to. Catalysis and the Internal Combustion Engine, E. Sokal. Chem. & Industry, vol. 43, no. 35, Aug. 29, 1924, pp. 283T-284T. Points out that so far catalytic coating called "Katalite" has been used in engines without any change in engine; it is considered possible and even probable that with certain changes, much greater effects could be produced which might have bearing on utilization of low-grade fuels, running of engines at constant-compression pressure, and various other questions of design and operation.

Chemical Structure of Motor Engine, E. Sokal. Oil & Gas Jl., vol. 23, no. 5, June 26, 1924, pp. 88, 126-127 and 130-131. Catalytic coating for surface of cylinder head suggested for counteracting carbon and detonation. Accelerates combustion.

Combustion, Acceleration of. See Catalysis Applied to.

Compressor Engines. Increasing Efficiency of Internal-Combustion Engines (Leistungssteigerung an Verbrennungsmotoren), G. Prayer. Motorwagen, vol. 27, no. 27, Sept. 30, 1924, pp. 483-489, 11 figs. Describes different types of compressor engines, and recent improvements in design.

Constant-Compression. The Essentials of a Successful Constant-Compression Engine, C. E. Sargent. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 5-10, 9 figs. It is shown that constant-compression engines in which throttling is eliminated are feasible; construction permits admission of inert gas at less than full load during first part of induction stroke and of burnable gas during last part; describes new type developed to prove that engine could be designed to maintain constant compression and mean effective pressure commensurate with load.

Cooling. Cooling of Light Internal-Combustion Engines (Zur Kühlung leichter Verbrennungsmotoren), K. R. H. Praetorius. Motorwagen, vol. 27, no. 32, Nov. 20, 1924, pp. 590-602, 25 figs. Design and functioning of Adler, Benz, Bayern, Daimler, Hupp, Ford, Vauxhall, and other cars.

Cooling Water, Utilization of Heat in. Utilization of the Heat in the Cooling Water of Internal Combustion Engines (Die Ausnutzung der im Kühlwasser der Verbrennungsmotoren enthaltenen Wärme). Wärme- und Kälte-Technik, vol. 26, no. 8, Apr. 30, 1924, pp. 63-64, 3 figs. Various combinations of radiators with water jackets of internal-combustion engines are shown.

Crankshafts. See CRANKSHAFTS, Explosion-Engine, Resonance of.

Detonation. Air-Hydrogen Explosions in Closed Vessels, R. W. Fenning. Aeronautical Research Committee (Lond.)—Reports & Memoranda, no. 902, Apr. 1924, 33 pp., 27 figs. on supp. plates. Details of experiments carried out at Nat. Physical Lab. for Aeronautical Research Committee, which form first part of a general investigation of "detonation" and deal with influence on production of "detonation" of mixture strength, initial temperature, initial pressure, turbulence, multiple ignition points, depth of vessel, nature and proportion of diluent, and formation of pockets in explosion vessel.

Relative Effects of Some Nitrogen Compounds upon Detonation in Engines, T. A. Boyd. Indus.

& Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 893-895, 3 figs. Data shows that, in general, nitrogen compounds which are most effective for suppressing detonations are the primary and secondary amines.

Driving Gear. Features of the Synchro-Balance Driving Gear. Gas & Oil Power, vol. 20, no. 230, Nov. 6, 1924, pp. 27-28, 4 figs. Invention brought out by Blackstone & Co. which makes for lightness and compactness.

Efficiency Standards. Efficiency Standards for Internal Combustion Engines. Engineer, vol. 137, no. 3563, Apr. 11, 1924, p. 394. See also Shipbldg. & Shipg. Rec., vol. 23, no. 15, Apr. 10, 1924, pp. 426-427. Discussion by Committee on Tabulating Results of Heat Engine and Boiler Trials on standards of comparison for thermal efficiency of internal-combustion engines.

Standards of Comparison in Connection with the Thermal Efficiency of Internal Combustion Engines, G. J. Wells. Gas. Jl., vol. 166, no. 3179, Apr. 16, 1924, pp. 172-175, 4 figs. See also Gas Wld., vol. 80, no. 2073, Apr. 12, 1924, pp. 338-339. Traces investigation of subject from commencement of work of original committee appointed by Instn. Civil Engrs. in 1903, to which reference is made to compute ideal efficiency. Standard recommended involves use of air as ideal fluid, together with hypothesis that its specific heat was constant over range of pressures and temperatures involved.

Exhaust-Gas Analysis. Composition of Exhaust Gas of Explosion Motors (Die Abgaszusammensetzung von Explosionsmotoren), M. Moller and M. U. Büchting. Motorwagen, vol. 27, no. 23, Aug. 20, 1924, pp. 400-403, 7 figs. Describes Siemens & Halske CO + H_2 meter and shows that content in unconsumed gases is dependent on load, compression, nozzle position of carbureter, time of ignition and lubrication of engine.

Exhaust Gases, Unburned Fuel in. Ingenious Device Used to Determine Unburned Fuel in Exhaust Gases. Automotive Industries, vol. 51, no. 13, Sept. 25, 1924, pp. 568-569, 5 figs. Describes instrument manufactured by Siemens & Halske Elec. Wks. for determination of percentage of unconsumed fuel gases in flue gases. Based on principle that any fuel gases contained in exhaust gases, if mixed with a suitable proportion of oxygen or air, can be ignited and burned if led past a moderately heated wire of a metal having catalytic properties, such as platinum. From article in Motorwagen by M. Moeller and M. U. Büchting.

Exhaust-Valve Temperatures. Exhaust-Valve and Cylinder-Head Temperatures in High-Speed Petrol Engines, A. H. Gibson and H. W. Baker. Instn. Mech. Engrs.—Proc., vol. 2, no. 6, 1923, pp. 1045-1092 and (discussion) 1093-1119, 31 figs. Investigation shows that, in well-designed overhead-valve engine, either of air- or water-cooled type, under normal conditions of operation, temperature of exhaust valve may be between 600 and 750 deg. cent.; best shape of valve head appears to be one having flat bottom and tulip-shaped top, but as this is impracticable owing to weight, next best is one having tulip-shaped head common in airplane-engine practice; conditions tending to give hot valve also tend to give hot cylinder head.

Factory Power Plants. The Control of Power Production, Chas. L. Hubbard. Factory, vol. 32, no. 4, Apr. 1924, pp. 482-486, 17 figs. Internal-combustion engines as source of factory power.

Flow of Gases in. The Flow of Gases in Two-Cycle Internal-Combustion Engines (Om strömningsförloppet i tvåtaktmotorer), E. Carlberg. Teknisk Tidskrift, vol. 54, no. 38, Sept. 20, 1924, pp. 105-108 (Mekanik), 1 fig. Scavenging of combustion cylinders is investigated by means of gas samples taken from their contents at different points of cycles. These samples are analyzed and efficiency of scavenging is deducted from their chemical composition and from one of the fuel gases. A formula for scavenging efficiency is derived.

Flywheel Design, Chart for. Finding the Flywheel Weight Required by an Internal-Combustion Engine, P. H. Schweitzer. Power, vol. 59, no. 18, Apr. 29, 1924, p. 673, 1 fig. Presents chart for flywheel design including full instructions as to steps to be followed when using chart.

Fuels. Contribution to the Theory of Fuels for Engines (Contribution à la théorie des combustibles pour les moteurs), M. Brutzkus. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 136, no. 5, May 1924, pp. 397-425, 1 fig. Discusses combustion-engine fuels, including mineral oils, tar oils, gaseous fuel; fuel increasing and decreasing in volume; efficiency of combustion.

Decomposition of Tetraethyl Lead and Its Use in Explosion Engines (Sur la décomposition du plomb tétraéthyle et son application aux moteurs à explosion), P. Jolibois and G. Normand. Académie des Sciences—Comptes rendus des séances, vol. 179, no. 1, July 7, 1924, pp. 27-28. This fuel allows increase of compression and reduces chances of spontaneous explosion of gaseous mixture.

Lignite Distillate, Chas. E. Kerchner. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 516-518, 4 figs. Its possibilities as an internal-combustion-engine fuel. Data on tests made with a small Hvid engine operating on lignite oil, as compared with gas oil and kerosene. Shown to be an efficient and likely fuel.

See also Vegetable Oil as Fuel; AUTOMOBILE FUELS.

Gas Distribution in. Determination of Gas Distribution in Internal-Combustion Engines by Gas Analysis, G. W. Jones, W. P. Yant and L. B. Berger. U. S. Bur. Mines—Reports of Investigations, no. 2631, Aug. 1924, 6 pp., 4 figs. on supp. plates. Describes simple portable apparatus for making determination; tests showing results obtained from engine having good distribution, and tests made under road conditions on engine giving poor distribution.

Heat Transmission from Working Fluid. The Rate of Heat Transmission from the Working Fluid in an Internal Combustion Engine, A. H. Gibson. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 281, May 1924, pp. 883-895. Results from investigations and conclusions.

Heavy-Oil. See DIESEL ENGINES; OIL ENGINES; SEMI-DIESEL ENGINES.

High-Speed Four-Cycle. On Increasing the Size of the Gas Passages in High-Speed Four-Cycle Engines (Dell'ingrandimento delle luci di passagio dei gas nel motore veloce a quattro tempi), P. Tedeschi. Industria, vol. 38, no. 5, Mar. 15, 1924, pp. 133-136, 4 figs. Cylinder and valve arrangement and proportions by means of which area of gas passages is always 50 per cent, power output markedly increased, and efficiency improved.

Hot-Bulb and High-Compression. Hot-Bulb and High Compression Engines in Sweden, G. Dellner. Engineering, vol. 118, no. 3055, July 18, 1924, p. 105. Discusses hot-bulb engines and recent improvements, including new methods of starting, application of ball bearings in main bearings. Ellwe and Polar high compression engines and their operation. Abstract of paper read before World Power Conference.

Indicators for. See INDICATORS, Internal-Combustion-Engine.

Inert Diluents. Inert Diluents, J. F. Alcock. Automobile Engr., vol. 14, no. 190, June 1924, pp. 165-170, 10 figs. Their effect on working fluid of internal-combustion engine.

Internal Losses. How Internal Losses in Power Plants Vary with Speed, P. M. Heldt. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 556-558. Determined by "motoring" engine with electric dynamometer; torque representing pumping loss is directly proportional to r.p.m., but frictional loss is independent of that factor.

Lubrication. Lubrication of Internal Combustion Engines, H. B. Warner. Ariz. Min. Jl., vol. 7, no. 18; Feb. 15, 1924, pp. 21-22. Data regarding cycle of operations of internal-combustion engines.

See also STEAM ENGINES, Lubrication.

Marine. Technical and Economic Questions of Oil Firing on Merchant Ships (Technische und wirtschaftliche Fragen der Oelfeuerung in der Handelsschiffahrt), D. B. Schultz. Fördertechnik u. Frachtverkehr, vol. 17, no. 12, June 18, 1924, pp. 166-167. Discusses earliest oil firing for small boats in Germany; modern oil plants including bunkers and tanks, oil consumption per hp-hr., advantages and economy of oil firing.

Mewes. The Mewes Engine, Old and New Types (Der Mewes-Motor in alter und neuer Bauart), R. Mewes. Serial article in Zeit. für Sauerstoff- u. Stickstoff-Industrie, beginning vol. 14, no. 12, Dec. 1922, and continuing through vol. 15, nos. 1, 2, 3, 5, 7, 8, 9, 10, and 11, Jan., Feb., Mar., May, July, Aug., Sept., Oct., and Nov. 1923, and vol. 16, no. 2, Feb. 1924. Construction, operation and efficiency of 1901 type, and new developments added; indicator diagrams; objections raised against Mewes engine; Mewes gas-air-pressure engine, using exhaust gases of explosion and internal-combustion engines mixed with compressed air; advantages of Mewes engine; theory.

Naphthalene. Naphtalene Engines (Les moteurs à naphthaline), C. Anguenot. Société Industrielle de Mulhouse—Bul., vol. 90, no. 1, Jan. 1924, pp. 57-71, 6 figs. Types of engine for burning naphthalene, constructed by Société anonyme des moteurs économiques à naphthaline (A. A. M. E. N.), said to be particularly well adapted to light industry and farming.

Oil Engines. See OIL ENGINES; DIESEL ENGINES; SEMI-DIESEL ENGINES.

Radiation Characteristics. Radiation Characteristics of the Internal-Combustion Engine, Thos. Midgley, Jr., and H. H. McCarty. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 182-185, 7 figs. Presents data showing how radiation varies with changes in character of combustion; it is concluded that radiation produced during internal combustion is function of chemical reaction involved to much greater extent than are merely temperatures of gases, although these play a marked part.

Railway Traction Application. Application of Internal-Combustion Engines to Railway Traction and Ship Propulsion (Application des moteurs à combustion interne à la traction sur voies ferrées et à la propulsion des navires), M. Bochet. Revue Universelle des Transports, vol. 1, nos. 9 and 10, July 1 and 15, 1924, pp. 141 and 155-157, 1 fig. Discusses heavy oil engines with mechanical fuel injection, two and four-stroke.

Residues, Formation of. Formation of Residues in Superheated-Steam Engines and Internal-Combustion Engines and Their Prevention (Die Rückstandsbildung in Heissdampfmaschinen und Verbrennungskraftmaschinen und ihre Verhütung), G. Spettmann. Praktische Maschinen-Konstrukteur, vol. 57, no. 22, June 17, 1924, pp. 309-310. Discusses producer gas and Diesel engines, gas residues and their combination with lubricating oil, complete combustion of fuel, etc.

Scott-Still. See OIL ENGINES, Scott-Still; Solid-Injection.

Seddin Show, Germany. Internal-Combustion Engines at the Seddin Railway Exposition (Der Nutzmotor auf der Eisenbahnausstellung in Seddin), R. C. v. Gorrissen. Wirtschaftsmotor, vol. 6, no. 10, Oct. 25, 1924, pp. 1-2. Brief review of exhibits of internal-combustion engines and their application in railway operation and shop practice.

Steam-Oil. See Scott-Still.

Supercharging. Supercharger Pros and Cons, W. G. Aston. Autocar, vol. 53, no. 1507, Sept. 5, 1924, pp. 413-416, 3 figs. Considers advantages and disadvantages of latest development in internal-combustion engine design; shows supercharger has far wider potentialities and discusses advantages that may accrue from its general adoption.

Synchro-Balance. The Synchro-Balance Internal-Combustion Engine: Empire Exhibition. Engineering, vol. 118, no. 3069, Oct. 24, 1924, p. 593, 4 figs. Describes mechanism employed for transforming reciprocating motion of pistons into rotary motion of crankshaft.

Temperature-Entropy Diagram. A Modified Temperature-Entropy Diagram for a Gaseous Working Substance, G. E. Scholes. Engineering, vol. 118, no. 3059, Aug. 15, 1924, pp. 215-216, 1 fig. Construction of chart. Transference of indicator diagram to Tϕ chart.

Temperature, Influence of Mixture on. Strength of Mixture Has Marked Effect on Engine Temperature, C. B. Dicksee. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 566-571, 7 figs. Influence not always realized sufficiently; recent researches show relationship; experiments indicate detonation is function of rate of flame propagation.

Temperature Variation in. A Study on the Periodic Temperature Variation in the Internal Combustion Engine, K. Takémura. Tokyo Imperial University—Jl., vol. 15, no. 3, Sept. 1924, pp. 13-53, 3 figs. Cyclic temperature variation of working fluid in internal-combustion engine; thermal state of ignition ball; movement of heat in cylinder wall.

Tetraethyl Lead, Use in. See Fuels.

Theory of. Contribution to the Theory of Internal-Combustion Engines (Contribution à la théorie des moteurs à combustion interne), M. Brutzkus. Technique Moderne, vol. 16, no. 4, Feb. 15, 1924, pp. 105-112, 7 figs. Rudiments and formulas of theoretical chemistry; combustion in engines and variation of pressure; combustion and variation of temperature; combined action of these three factors; study of fuels employed.

Two-Cycle Double-Acting. A New Two-Cycle Double-Acting Engine (Un nouveau moteur à deux temps et à double effet), R. Mathieu. Outillage, vol. 344, no. 3, Mar. 1924, pp. 17-18, 2 figs. Details of Leroy light explosion-type engine.

Vegetable Oil as Fuel. Increasing Compression in Internal-Combustion Engines (L'augmentation de la compression dans les moteurs à combustion interne), M. G. Lumet. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 4-6, Apr.-June 1924, pp. 365-380. Satisfactory results of tests of six 2- and 4-stroke engines with vegetable oils, carried out jointly by Indus. Research Bur. and Technical Commission of Automobile Club.

INVENTION

Stimulation of Employees. How to Stimulate Invention by Employees, H. A. Toulmin, Jr. Factory, vol. 32, no. 4, Apr. 1924, pp. 490-492, 580,

and 582, 6 figs. Nine methods from experience of five companies.

INVENTIONS

Property in. Inventions by Employees (Zum Kapitel der Angestellten-Erfindungen), J. Aumund. Schweizerische Bauzeitung, vol. 84, nos. 6 and 9, Aug. 9 and 30, 1924, pp. 67-70 and 106-110, 4 figs. Discusses ownership of inventions by employees from employers' and employees' standpoint, laws applicable in various countries, including laws of Switzerland.

IONIZATION

Positive-Ray Analysis. The Application of Positive Ray Analysis to Ionization Problems, H. D. Smyth. Franklin Inst.—Jl., vol. 196, no. 6, Dec. 1924, pp. 795-811, 10 figs. Describes difficulties of combining method for determining ratio of mass to charge of ion with ionizing potential experiments which have been overcome; results obtained by methods developed and their bearings on ionization problems.

IONS

Gaseous. The Constitution of Gaseous Ions, J. J. Nolan. Physical Rev., vol. 24, no. 1, July 1924, pp. 16-30, 4 figs. Discusses mobility in dry and moist air; gives current-voltage curves showing periodic inflections about every 10 volts indicating intervening groups, making some 20 groups of ions with mobilities varying from 2.24 to 1.34.

IRON

Alloys. See IRON ALLOYS.

Analytical Determination. Copper as Reducing Agent in Iron Determinations, J. M. Hendel. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, p. 951. Describes use of copper reductor for determination of iron in presence of vanadium, and of vanadium in steels and other alloys.

Examination of Iron from Konarak, J. N. Friend and W. E. Thorneycroft. Iron & Steel Inst.—Advance Paper, no. 5, for meeting Sept. 1924, 3 pp., 2 figs. on supp. plate. Examination of a specimen of iron beams, used as supports under lintels of doorways and to assist in corbelling-in of roof, from black pagoda at Konarak in Madras Presidency, India.

Annealing, Crystal Growth during. The Production of Large Crystals by Annealing Strained Iron, C. A. Edwards and L. B. Pfeil. Iron & Steel Inst.—Advance Paper, no. 7, for meeting May 1924, 19 pp., 22 figs. Research carried out to determine more definitely conditions under which very large crystals were formed in iron by annealing after plastic deformation.

Behavior in High-Frequency Fields. Characteristics of Iron in High Frequency Rotating Magnetic Fields, L. Tonks. Jl. Optical Soc. Am. & Rev. of Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 221-238, 8 figs. Describes investigation of behavior of iron in a high-frequency rotating field, carried out at frequencies from 50,000 to 170,000 cycles per second.

Carbonizing with Oxy-Acetylene Flame. Surface Hardening with Oxy-Acetylene Flame, J. F. Springer. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 36-37. Points out that torch process will mark out for itself field sharply defined and superior to its competitors; limitations of oxy-acetylene carbonizing; main advantages of torch process; experiments on cast steel.

Cast. See CAST IRON.

Castings. See IRON CASTINGS.

Cementation. The Cementation of Iron by Silicon, R. T. Haslam and L. E. Carlsmith. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1110-1113, 8 figs. Deals with important variables affecting siliconization of iron, as follows: (1) temperature of cementation, (2) duration of heat, (3) composition of silicon, (4) composition of metal, and (5) atmosphere used in cementation furnace; microscopic and analytical studies of various reaction products, together with consideration of acid resistance of case metal.

See also CEMENTATION, Iron.

Change When Heated. An Assumption as to the Cause of the Change of Body-Centered Alpha-Iron to Face-Centered Gamma-Iron, E. J. Janitsky. Am. Soc. Steel Treating—Trans., vol. 6, no. 6, Dec. 1924, pp. 728-731, 2 figs. Mathematical explanation of causes for change of iron, when heated, from face-centered to body-centered orientation.

Charcoal. Swedish Charcoal Iron, N. Danielsen. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 569-572, 7 figs. Manufacturing process, properties, and uses.

Cold Work, Effect of. The Effect of Cold-Work upon the Density of Crystals of α-Iron, H. O'Neill. Iron & Steel Inst.—Advance Paper, no. 13, for meeting May 1924, 12 pp., 4 figs. Tests on Armco iron and on single crystal; results.

Constitution. Constitution of Technical Iron (Zur Konstitution des technischen Eisens), F. Wever. Zeit. für Elektrochemie, vol. 30, no. 7, July 1924, pp. 376-382, 3 figs. Discusses experiments on relation of carbon and various polymorphous modifications of iron; structure of solid solution γ-iron-carbon, structure of α-iron in annealed carbon steels, etc.

Corrosion. The Influence of Emulsoids Upon the Rate of Solution of Iron, J. N. Friend, D. W. Hammond and G. W. Trobridge. Am. Electrochem. Soc.—Advance Paper, no. 14, for meeting Oct. 2-4, 1924, pp. 197-207, 6 figs. A possible method is suggested of treating natural and other waters, to render them less corrosive toward ferrous and non-ferrous metals in practice. Results of experiments on corrosion of iron in lead-acetate solution and in copper-sulphate solution; rate of solution of iron in dilute sulphuric acid.

The Relation of Hydrogen Ion Concentration to the Corrosion of Iron, J. W. Shipley and I. R. McHaffie. Can. Chem. & Metallurgy, vol. 8, no. 5, May 1924, pp. 121-124, 6 figs. Corrosion of iron in contact with graphite; corrosion of iron in absence of oxygen; corrosion of gray cast iron in soil water of pH 7.4 and saturated with oxygen; hydrogen-ion concentration obtained when iron is in contact with water; rate of corrosion of iron in absence of oxygen in solutions of various hydrogen-ion concentrations.

See also CORROSION, Iron and Steel.

Crystallization. Written Discussions of Professor Albert Sauveur's Paper Entitled "Crystallization of Iron and Its Alloys." Am. Soc. Steel Treating—Trans., vol. 5, no. 2, Feb. 1924, pp. 209-222, 2 figs. Includes discussions by O. W. Ellis, E. E. Thum, and N. T. Belaiew, with closure by A. Sauveur.

Density, Determination of. Determination of the Density of Iron and Other Refractory Metals in the Liquid State (Methode pour la détermination de la densité du fer et d'autres métaux réfractaires dans l'état liquide), C. Benedicks. Académie des Sciences—Comptes Rendus, vol. 179, no. 7, Aug. 18, 1924, pp. 389-391, 1 fig. Apparatus employed consists of two U-tubes fitted so that each limb of one tube is connected with corresponding limb of other; mercury is placed in one tube, metal under investigation in other, and connecting spaces are filled with inert gas; when second tube is heated both metals show difference in level between the two limbs of their tubes, inversely proportional to their densities; that of mercury being known, that of other metal may be calculated; results of experiments.

Deposition. Deposition of Iron Containing Carbon in the Electrolysis of Solutions Containing Double Oxalates of Iron (Ueber die Abscheidung kohlenstoffhaltigen Eisens bei der Elektrolyse von Eisendoppeloxalat-Lösungen), W. Sontag. Zeit. für Elektrochemie, vol. 30, no. 7, July 1924, pp. 333-344. Conditions of deposition of iron containing carbon during electrolysis of solutions containing ammonium salts of oxalic acid and other organic acids were determined and some products of reduction identified.

Deposits. See IRON DEPOSITS.

Desulphurization. Use Sodium Flux for Iron. Foundry, vol. 52, no. 24, Dec. 15, 1924, pp. 982-984, 4 figs. Method for purifying and desulphurizing molten iron in cupola furnace and ladle by special flux is tested in Cleveland shop; two sodium salts used.

Deterioration from Rolling Friction. Testing the Deterioration of Iron and Steel from Rolling Friction without Application of Lubricants (Ueber die Prüfung der Abnutzung von Eisen und Stahl bei rollender Reibung ohne Schmiermittel), H. Meyer and F. Nehl. Stahl u. Eisen, vol. 44, no. 17, Apr. 24, 1924, pp. 457-464, 25 figs. Different kinds of deterioration and their testing; wear through rolling friction and its practical importance; method of testing; process of deterioration; testing deterioration of different kinds of hard iron; change in structure through process of deterioration; influence of increased pressure and structure-changing heat treatment; zone of segregation and direction of grain.

Determination of. New Method for the Determination of Iron by Means of Permanganate in the Presence of Hydrochloric Acid (Neues Verfahren zur Bestimmung des Eisens mit Permanganat in salzsaurer Lösung), W. Manchot and F. Oberhauser. Zeit. für anorganische u. allgemeine Chemie, vol. 138, no. 2, Aug. 19, 1924, pp. 189-194. Points out that in presence of hydrochloric acid, titration of solutions of ferrous salts by permanganate results in use of too much permanganate owing to liberation of free chlorine; error may be accurately allowed for by determining amount of free chlorine liberated, by one of two methods which are described.

Direct Production from Ore. The Direct Production of Iron, E. Fornander. Chem. & Met. Eng., vol. 30, nos. 22 and 23, June 2 and 9, 1924, pp. 864-868 and 907-910, 10 figs. Critical review of more important methods used to produce wrought iron from ore.

Electrodeposited. See ELECTRODEPOSITION, Iron.

Electrolytic. Electrolytic Iron, T. W. S. Hutchins. Iron & Coal Trades Rev., vol. 109, no. 2942, July 18, 1924, pp. 117-118. See also World Power, vol. 2, no. 12, Dec. 1924, pp. 339-347, 17 figs. on supp. plate. Discusses processes for commercial production of electrolytic iron in tubes, sheets, etc., i.e. with anodes formed and soluble anodes shaped but insoluble, anodes soluble but unformed. (Abstract.) Paper read before World Power Conference.

Magnetic and Electric Properties of Electrolytic Iron and Its Alloys Melted in Vacuo and Rolled Into Sheet, M. Fukuda. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 435, Oct. 1924, pp. 978-1007, 8 figs. Results obtained with direct-current testing; measurement of core losses with alternating current and separation of hysteresis and eddy current losses; magnetization with alternating currents. (In English.)

Progress in Electrolytic Iron, D. Belcher. Am. Electrochem. Soc.—Advance Paper, no. 11, for meeting, Apr. 24-26, 1924, pp. 157-172, 1 fig. Summary of progress made in electrodeposition of iron in last 75 years; describes two plants in commercial operation, and gives account of development work on Milford process for hydrometallurgy of iron ores.

The Recrystallization of Electrolytic Iron (Die Rekristallisation des Elektrolyteisens), P. Oberhoffer and W. Oertel. Stahl u. Eisen, vol. 44, no. 20, May 15, 1924, pp. 560-561, 1 fig. Results of investigation at Iron Met. Inst. of Tech. High School of Aachen (Aix-la-Chappelle).

Etching Figures and Twinning. Etching Figures and Twinning in Iron (Aetzfiguren und Zwillingsbildungen in Eisen), K. Harnecker and E. Rassow. Zeit. für Metallkunde, vol. 16, no. 8, Aug. 1924, pp. 312-314, 13 figs. Describes and gives photomicrographic reproductions of effects obtained in specimens of iron.

Fatigue. See IRON AND STEEL, Fatigue.

Hardness, Causes of. Physical Factors Affect Iron, J. H. Hopp. Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 11-12. Hard castings ascribed to chemical content in many cases are due to causes other than metal; shrinkage alleviated by proper gates and risers. (Abstract.) Paper before Chicago Foundrymen's Club.

Magnetization. The Barkhausen Effect, E. P. T. Tyndall. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 439-451, 6 figs. Deals with discontinuities in magnetization of iron and other magnetic materials. Describes work undertaken to test hypothesis that phenomenon is due to magnetization of single crystals and to obtain a more detailed picture of it than has yet been presented.

Manufacture, Norway. Manufacture of Iron in Norway. Norwegian Trade Rev., no. 3, 1924, pp. 33-35. Historical review of iron industry in Norway.

Martensite, Nature of. The Nature of Martensite, E. C. Bain. Am. Inst. Min. & Met. Engrs.—Trans., no. 1299-S, Feb. 1924, 11 pp., 4 figs. Study of its formation and structure with facts about its parent substance, austenite.

Mines. See IRON MINES.

Mining. See IRON MINING.

Molten, Specific Gravity of. Method of Determination of the Specific Gravity of Molten Iron and of Other Metals of High Melting Temperature (Metod för bestämning av spec. vikt hos flytande järn och andra svårsmälta metaller), C. Benedicks, D. W. Berlin and G. Phragmén. Jernkontorets Annaler, vol. 108, no. 6, 1924, pp. 308-333, 9 figs. Molten metal is contained in U-shaped tube of very high melting point and difference of levels in two legs of tube is measured by electrical methods; said difference is produced by pressures of inert gas and difference of pressures is measured by means of mercury column. Report from Swedish Metallographical Inst.

Nitrogen in. Nitrogen in Iron, J. K. Smith. Foundry Trade Jl., vol. 29, no. 404, May 15, 1924, pp. 403-405. Possible elements for elimination of nitrogen, vanadium in cast iron, nitrogen in steel, titanium steel, entry of nitrogen, possible explanation of inherent properties, etc.

Oxygen in. Ferrous Alloys Research, W. Rosenhain, F. S. Tritton, E. Hanson and T. E. Rooney. Iron & Steel Inst.—Advance Paper no. 10, for meeting Sept. 1924, 43 pp., 32 figs., partly on supp. plates. Describes research carried out to determine constitution of iron-oxygen alloys, and effect of oxygen and iron on mechanical and physical properties of iron. Discusses estimation of oxygen in pure iron.

Passivity. See METALS, Passivity.

Permeability. On the Measurement of the Complex Permeability of Iron, H. Nukiyama and Y. Shôji. Tôhoku Imperial Univ.—Technology Reports, vol. 4, no. 1, 1924, pp. 21-49, 19 figs. Complex permeability in non-revolving alternating magnetic field; fundamental ellipse; real and

imaginary fundamental ellipse and density of vector power loss; arrangement for measuring apparent complex permeability, and theory concerning measurement of complex permeability. Bibliography.

Pig. See IRON, PIG.

Plastic Deformation. The Plastic Deformation of α- and γ-iron, F. C. Thompson and W. E. W. Millington. Iron & Steel Inst.—Advance Paper, no. 15, for meeting May 1924, 26 pp., 14 figs. Results of investigation.

Production Direct from Ore. See IRON METALLURGY, Direct Production Process.

Red-Shortness. Influence of Sulfur, Oxygen, Copper and Manganese on the Red-Shortness of Iron, J. R. Cain. Am. Electrochem. Soc.—Advance Paper no. 16, for meeting Oct. 2-4, 1924, pp. 233-245, 5 figs. Review of work of previous investigators. Details of investigations made on a series of small experimental ingots, and results obtained.

Salt Solutions, Action on. The Action of Salt Solutions on Iron and Steel in the Presence of Oxygen, U. R. Evans. Chem. & Industry, vol. 43, no. 44, Oct. 31, 1924, pp. 315T-322T, 9 figs. Detailed study of action of drops of solutions of different salts on iron, with special regard to factors which cause some salts to stimulate corrosion and others to reduce it.

Separation of Calcium and. Ferric Oxalate and Its Application to the Separation of Iron and Calcium (Sur l'oxalate ferrique; application à la séparation du fer et du calcium), J. Barlot. Société Chimique de France—Bul., vol. 35-36, no. 8, Aug. 1924, pp. 1026-1030. Ferric oxalate is obtained by slow evaporation of solution of ferric hydroxide in saturated oxalic-acid solution; it is proposed to separate iron and calcium by taking advantage of fact that in presence of ammonium oxalate and acetic acid, double calcium ferric oxalate is quantitatively decomposed into soluble ferric ammonium oxalate and insoluble calcium oxalate.

Spectrum. See SPECTRA, Iron.

Sponge. The Production of Sponge Iron, C. E. Williams, E. P. Barrett and B. M. Larsen. U. S. Bur. Mines—Report of Investigations, no. 2656, Nov. 1924, 14 pp., 7 figs. Use of sponge iron for precipitation of metals and for conversion to iron and steel; tests with small direct-fired rotary kilns; concentration of furnace products.

Steel and. See IRON AND STEEL.

Strain Limit. The Strain Limit of Iron (Die Fliessgrenze des Eisens), A. Nádai. Schweizerische Bauzeitung, vol. 83, nos. 14 and 15, Apr. 5 and 12, pp. 157-160 and 172-175, 42 figs. Results of tensile compression tests with specimens of soft iron.

Sulphur Determination. Apparatus for the Determination of Sulphur in Iron and Steel (Ein neuer Apparat zur Bestimmung von Schwefel in Eisen und Stahl). Chemiker-Zeitung, vol. 48, no. 38, Mar. 27, 1924, pp. 180-181, 1 fig. Describes compact apparatus which requires no supporting stand and consists simply of two pieces of strong glassware; device consists of vessel shaped like outer case of Liebig condenser, but with upper outlet only, connected to absorption apparatus; through axis of this vessel is fitted trapping device which prevents water in vessel from running back into flask and at same time efficiently removes hydrogen chloride from evolved gases.

Determine Sulphur Content in Iron, L. J. Wise and L. H. Rudesill. Foundry, vol. 52, no. 9, May 1, 1924, pp. 347-348. Points out inaccuracy of evolution method when sulphur content is over 0.10 per cent, and gives results of new method tried by author.

New Analytical Measuring Method for the Determination of Sulphur in Iron and Steel (Neues massanalytisches Verfahren zur Schwefelbestimmung in Eisen und Stahl), H. Pinsl. Stahl u. Eisen, vol. 44, no. 3, Jan. 17, 1924, pp. 72-74. Points to high cost of iodometric method; principles underlying new method and results of tests on iron and steel samples.

Transformations in. On the Transformations in Pure Iron, K. Honda. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 187-194, 6 figs. Discusses A_3 transformation not being change of phase, X-ray analysis showing that there is no change of phase below A_3 point; nature of A_2 transformation, showing distinct difference between A_2 change and ordinary change of phase.

Wrought, Nick-Bend Test for. The Nick-Bend Test for Wrought Iron, H. S. Rawdon and S. Epstein. U. S. Bur. Standards—Technologic Papers, no. 252, Feb. 29, 1924, pp. 115-155, 23 figs. Details of and results obtained from investigation which consisted of fracturing, under different conditions, of nicked bars of a number of grades of wrought iron, and study of character of fracture.

IRON ALLOYS

Acrite. See Stellite and Similar.

Chromium-Iron. Some Engineering Applications of High-Chromium-Iron Alloys, C. E. MacQuigg. Am. Soc. for Testing Matls.—Preprint of paper no. 19j, for meeting June 24-27, 1924, 10 pp., 6 figs. Uses and limitations of an alloy with about 25 to 30 per cent of chromium and fractions of one per cent of silicon and manganese, remainder largely iron; carbon varies from about 0.1 to 3 per cent, depending on properties desired.

Corrosion. The Corrosion of Iron Alloys by Copper Sulfate Solution, C. M. Kurtz and R. J. Zaumeyer. Am. Electrochem. Soc.—Advance Paper, no. 26, for meeting Oct. 2-4, 1924, pp. 417-426. Samples of 400 different forgeable iron alloys were subjected to copper sulphate test; alloys containing chromium appeared most resistant; silicon was also found to be very effective.

Dendritic Segregation. Use of Sodium Picrate in Revealing Dendritic Segregation in Iron Alloys, A. Sauveur and V. N. Krivobok. Am. Inst. Min. & Met. Engrs.—Trans., no. 1304-S, Feb. 1924, 13 pp., 10 figs. Explains possibility of using advantageously a boiling solution of sodium picrate to reveal dendritic segregation in steel; mechanism of action of reagent; failure of manganese alone to produce persistent dendritic segregation.

Iron-Carbon. A Laboratory Method for the Preparation of Small Steel Bars Differing Only in Carbon Content and the Effect of Changes in Carbide Concentration on the Specific Resistance, E. D. Campbell and G. W. Whitney. Am. Soc. for Steel Treating—Trans., vol. 6, no. 1, July 1924, pp. 33-50. Results of laboratory tests by means of which small steel bars varying only in carbon content may be prepared; also specific resistance measurements on these bars when annealed and when hardened by quenching in oil or in water.

Iron-Carbon and Iron-Nickel. The Granulation Hypothesis and the Delta-Gamma Change in Iron-Carbon and Iron-Nickel Alloys, N. T. Belaiew. Am. Soc. for Steel Treating—Trans., vol. 5, no. 6, June 1924, pp. 549-570, 12 figs. Points out that dendritic structure of alloys, as revealed by macro-etching, is a very stable structure and is not readily broken up during usual heat treatment operations. Discussion of castings and slowly cooled steels in relation to structure of dendrites, based upon investigations of author and Giolitti. Describes and discusses author's granulation

theory, and gives explanation of manner in which delta-gamma transformation might account for occurrence of granulation in alloys, cooled down from melt. Bibliography.

Iron-Nickel. Hardness of Iron-Nickel Alloys (Die Härte von Eisen-Nickel-Legierungen), H. Schottky. Zeit. für anorganische u. allgemeine Chemie, vol. 133, no. 1, Feb. 11, 1924, pp. 26-28. Maximum hardness of iron-nickel alloys depends on co-existence of two solid solutions, viz., α-iron in α-nickel and γ-iron in α-nickel.

Iron-Oxygen. See IRON, Oxygen in.

Iron-Silicon. Density of Iron-Silicon Alloys and Its Relation to Diagram of State (Ueber die Dichte von Eisen-Silizium-Legierungen und deren Beziehung zum Zustandsdiagramm), O. Hengstenberg. Stahl u. Eisen, vol. 44, no. 31, July 31, 1924, pp. 914-915, 1 fig. Results of pyknometer experiments with 25 to 95 per cent silicon alloys at 18 per cent, gives curve of Si content and specific volume and explains its points.

See also NITRIC ACID, Plants, Acid-Resisting Iron for.

Magnetic and Electrical Properties. Magnetic and Electrical Properties of the Ternary Alloys FE-SI-C, T. D. Yensen. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 558-567, 19 figs. Results of author's investigations show that carbon is largely responsible for variations in magnetic properties of iron and iron alloys, and that grain size has large and definite influence on magnetic properties; detrimental effect of sulphur, phosphorus and manganese on pure iron; beneficial effect of phosphorus on high-silicon alloys; increased reluctivity, coercive force, or hysteresis loss, due to carbon and other impurities are caused by inherent corresponding property of these precipitated impurities. (Abridged.)

Micrographic Detection of Carbides. Micrographic Detection of Carbides in Ferrous Alloys, N. B. Pilling. Am. Inst. Min. & Met. Engrs.—Trans., No. 1289-S, Jan. 1924, 5 pp., 6 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, p. 31. New reagent developed for micrographic analysis of silicon steels, consisting of a dilute solution of nitric acid and methyl alcohol in nitrobenzol; action differs from that of sodium picrate in that there is no persistent deep-seated staining and solution is used cold.

Microstructure of Iron-Carbon. The Microstructure of Austenite and Martensite, F. F. Lucas. Am. Soc. Steel Treating—Trans., vol. 6, no. 6, Dec. 1924, pp. 669-686 and (discussion) 686-691, 37 figs. on supp. plates. Author applies photomicrographical methods to study of structure of austenite and martensite, from results of which logical deductions of scientific value may be drawn; that revelations by high-power photomicrography seem to corroborate findings by methods of X-ray analysis is significant and should lead to better understanding of metal structures.

Preparation and Properties. Preparation and Properties of Pure Iron Alloys, J. F. T. Berliner. U. S. Bur. Standards—Scientific Papers, no. 484, Mar. 5, 1924, pp. 347-356, 4 figs. Determination of critical ranges of pure iron-carbon alloys by thermoelectric method.

Stellite and Similar. Stellite and Similar Alloys (Stellit und Stellitähnliche Legierungen), E. H. Schulz. Zeit. für Metallkunde, vol. 16, nos. 9 and 10, Sept. and Oct. 1924, pp. 337-343, and 382-387 and (discussion) 387-390, 28 figs. Sept.: Deals with alloys of ferrous metals; magnet steel; properties and heat treatment; permalloy; chemically highly resistive nickel and cobalt alloys; composition, structure, and efficiency of stellite. Oct.: Article by C. W. Drescher, on production and tests with acrite, a new cutting metal of adequate hardness, toughness, and resistance to heat.

IRON CASTINGS

Automobile Cylinders. Making a Monobloc Cylinder Casting. Eng. Production, vol. 7, no. 141, June 1924, pp. 176-180, 25 figs. Equipment designed for intensive manufacture of small monobloc cylinder castings of 63-mm. bore by 69-mm. stroke; methods adopted to secure quality in quantity production.

Reinforced Gray-Iron Castings (La fonte armée). Fonderie Moderne, vol. 18, Jan. 1924, p. 16, 1 fig. Describes process employed for manufacture of automobile-engine cylinders by Belgian foundry; all parts of cylinder where porosity is frequent are provided with thin steel wall which welds closely to iron and ensures perfect tightness; by use of this method it becomes possible to cast cylinders in soft graphitic irons; same method has been employed for making high-pressure gas and liquid containers.

Burning-On. Burning-on, J. H. List. Foundry Trade Jl., vol. 30, no. 436, Dec. 25, 1924, p. 542, 1 fig. Principles underlying burning-on; scope; basic conditions; governing factors as to possibility of burning; making an open burn-on; cracking of burns; burning-on boxed work.

Chill Formation. Chill Formation in the Annealing Process (Ueber die Schalenbildung beim Temperprozess), P. Oberhoffer and E. Zingg. Stahl u. Eisen, vol. 44, no. 40, Oct. 2, 1924, pp. 1197-1200, 6 figs., partly on supp. plate. Influence of gas phase on reduction and oxidation processes in annealing pots, as shown by practical tests; character of skin and chill; tests to determine cause of trouble.

Cleaning. Cleaning Iron Castings Hydraulically. Iron Age, vol. 113, no. 13, Mar. 27, 1924, pp. 946-948, 2 figs. See also Mech. Wld., vol. 75, no. 1955, June 20, 1924, pp. 389-390. Describes new method of cleaning castings, successfully experimented with at Erie, Pa., foundry of Gen. Elec. Co.; results in considerable saving of labor and time, and eliminates dust. Abstract of paper read by C. B. Lockhart before Pittsburgh Foundrymen's Assn.

Contraction and Warping. Contraction and Warping in Castings, J. Gray. Foundry Trade Jl., vol. 30, no. 427, Oct. 23, 1924, p. 348. Report of paper read to Inst. Brit. Foundrymen.

Cost. The Economic Cost of Iron Castings, H. L. Hall. Machy. (Lond.), vol. 24, no. 615, July 10, 1924, pp. 465-466. Author suggests that while it is true that there are slight variations in prices quoted for heavy and light and cored and uncored castings, both producers and consumers would benefit by adopting his practice of obtaining true cost of making any given casting and using that cost as basis of negotiations.

Cupola Mixtures for. Simplifying Cupola Mixtures, Geo. A. Drysdale. Foundry, vol. 52, no. 11, June 1, 1924, pp. 433-434. Claims that chemical composition of pig irons used should closely parallel that for castings required; uniform amounts used in cupola mixture produce more even product.

Cylinders. See CYLINDERS, Castings for; Motorcycle.

Defective. Defective Castings: Causes and Remedies. Foundry Trade Jl., vol. 29, no. 390, Feb. 7, 1924, pp. 125-128, 10 figs. Causes and remedies of different defects; eccentric cores; venting plates and gutters; small high-speed flywheels.

Diesel-Engine. See DIESEL ENGINES, Castings for.

Electric-Generator. Canadian Foundry Producing Record Castings, F. H. Bell. Can. Foundryman, vol. 15, no. 2, Feb. 1924, pp. 18-21 and 29, 4 figs. Methods of Can. Westinghouse Co., Ltd., Hamilton, in producing large electric generators.

Foundry Methods. See IRON FOUNDING.

Gray-Iron, Annealing. The Soft Annealing of Gray Iron Castings (Ueber das Weichglühen von Grauguss), E. Schüz. Stahl u. Eisen, vol. 44, no. 5, Jan. 31, 1924, pp. 116-118, 2 figs. Results of tests on time of annealing and speed of cooling of silicon-poor, thin-walled castings, for purpose of obtaining high dgree of softness; metallographic determination of phenomena through quenching tests; practical results.

Green-Sand. New Ways of Producing Castings in Green Sand (Neue Wege in der Herstellung von Gussstücken mit grünen Kernen), Freytag. Giesserei-Zeitung, vol. 21, no. 14, July 15, 1924, pp. 302-306, 13 figs. Detailed description and illustrations of new method for producing small castings in quantities.

Green-Sand Cores. New Methods for the Production of Castings with Green-Sand Cores (Neue Wege in der Herstellung von Gussstücken mit grünen Kernen), Freytag. Giesserei-Zeitung, vol. 21, no. 4, Feb. 15, 1924, pp. 62-65, 11 figs. A new method for production of electric-motor casings with cast-on webs and flanges, according to which not only casing core, but also flange core is set in green-sand mold and boxes are decanted in green state.

Locomotive. Making Locomotive Castings, H. E. Diller. Foundry, vol. 52, nos. 2, 3, and 4, Jan. 15, Feb. 1, and 15, 1924, pp. 53-60, 89-95, and 137-143, 27 figs. Jan. 15: Survey of objects and problems of foundry of Baldwin Locomotive Works, and description of molding and core work. Feb. 1: Description of molding and core work for making locomotive cylinders. Foundry operations and control, and study of foundry layout. Feb. 15: Supervision by contractors.

Molecular Equilibrium in. Molecular Equilibrium in Grey Iron Castings, I. Lamoureux. Foundry Trade Jl., vol. 30, no. 435, Dec. 18, 1924, pp. 524-525. Discusses problem of producing castings which shall be free from internal stresses; remedies for contraction; method of casting; chills and denseners; annealing and tumbling. (Abstract.) Translated from paper read before Assn. Technique de Fonderie.

Patterns. See PATTERNS.

Permanent-Mold. Permanent Mold Casting Methods Cut Production Expense, D. H. Meloche. Automotive Industries, vol. 50, no. 13, Mar. 27, 1924, pp. 711-714, 11 figs. Chief problem in developing successful method was to regulate properly cooling rate; results achieved have resulted in better quality and less cost. (Abstract.) Paper read before Soc. Automotive Engrs.

Reinforced Cylinders. See Automobile Cylinders.

Semi-Steel. See SEMI-STEEL, Castings.

Sulphur as Hardening Agent. Sulphur as a Hardening Agent, R. H. Palmer. Foundry, vol. 52, no. 22, Nov. 15, 1924, pp. 894-896, 8 figs. Series of experiments carried out to determine relative hardening value of varying amounts of sulphur added to iron which later was poured into chill molds.

Test Bars. Testing Iron to Control the Properties of Castings, G. W. Gilderman. Foundry Trade Jl., vol. 30, no. 428, Oct. 30, 1924, pp. 385-386. Factors that tend to make test bars unreliable; variation in casting qualities; chill tests criticized; test bars and properties of iron in castings; precautions needed in making test bars; hardness testing.

Titanium Additions, Effect of. Some Experiments as to the Effect of Titanium in Iron Castings (Einige Versuche über den Einfluss eines Titanzusatzes zum Rohguss auf den metallurgischen Verlauf des Temperprozesses), E. Piwowarsky. Stahl u. Eisen, vol. 44, no. 26, June 26, 1924, pp. 745-748, 7 figs. Results show that titanium favors formation of fine structure; effects more rapid decomposition of carbide and gasification of carbon.

Transformer-Box Production. Making Transformer Castings, P. Dwyer. Foundry, vol. 52, no. 3, Feb. 1, 1924. pp. 81-85, 10 figs. Describes methods and equipment employed in Pittsfield (Mass.) foundry of Gen. Elec. Co. in making transformer boxes.

Welding. The Influence of Mass Upon Methods of Preheating and Welding Large Iron Castings. Acetylene Jl., vol. 25, no. 9, Mar. 1924, pp. 441-443, 4 figs. Typical example of difficulties encountered in repairing massive castings, and correct method of carrying out repair. From Acetylene & Welding Jl., Lond.

See also ELECTRIC WELDING, ARC, Iron Castings.

IRON DEPOSITS

Alabama. Notes on the Clinton Group in Alabama, T. H. Aldrich. Am. Inst. Min. & Met. Engrs.—Trans., no. 1375-M, Oct. 1924, 4 pp., 1 fig. and (abstract) Min. & Metallurgy, vol. 5, no. 215, Nov. 1924, pp. 547-548, 1 fig. Clinton group of the Silurian holds red or fossiliferous ore and is from 100 to 500 ft. thick in Alabama; examination of boreholes made in drilling for oil demonstrate possibility of source for red ore not seriously thought of until lately.

Canada. See also IRON ORE, Canada.

India. Notes on the Kunghka and Manmaklang Iron Ore Deposits, Northern Shan States, Burma, E. L. G. Clegg. India, Geol. Surv.—Records, vol. 54, part 4, 1923, pp. 431-435. Geology, occurrence, and description of ore deposit, and composition of ore.

Lappland. More Iron-Ore in Lappland and of Better Quality. Swedish Export, vol. 7, no. 12, Dec. 1923, pp. 137-139, 1 fig. Gratifying result of deep boring at Kiruna and Malmberget.

Magnetite, Porto Rico. Magnetite Deposits of Eastern Porto Rico, C. R. Fettke. Am. Inst. Min. & Met. Engrs.—Trans., no. 1294-M, Feb. 1924, 15 pp., 6 figs. Geology of district and description of deposits.

Minnesota. Manganiferous Iron Ores of Cuyuna District, Minnesota, C. Zapfee. Am. Inst. Min. & Met. Engrs.—Trans., no. 1390-I, Dec. 1924, 11 pp. It is estimated that reserves of these ores are ample for some time.

New South Wales. Iron, L. F. Harper. New South Wales, Dept. Mines, Geol. Surv.—Bul. no. 4, 1923, 23 pp., 6 figs. on supp. plates. Summary giving information available up to date on iron ore deposits of New South Wales.

Ontario. The Iron Ore Situation in Ontario, G. W. MacLeod. Can. Inst. Min. & Metallurgy—Bul. no. 143, Mar. 1924, pp. 157-165. Facts revealed by Ontario Iron Ore Committee appointed to investigate situation.

Tennessee and North Carolina. Magnetic Iron Ores of East Tennessee and Western North Carolina, W. S. Bayley. No. Carolina Geological & Economic Survey—Bul. 32, 1923, pp. 11-252, 64 figs. and Tennessee Dept. Education Division Geology—Bul. no. 29, 1923, 252 pp., 64 figs., partly on supp. plates. Discusses distribution of hematitic, titaniferous, and non-titaniferous iron ores in rocks of pre-Cambrian age. Study under-

taken to learn something of their value as a source of supply to furnaces in the South.

IRON FOUNDING

Automobile-Foundry Practice. Metallurgical Control in Automobile Foundry Practice, A. Harley. Foundry Trade Jl., vol. 29, no. 395 and 396, Mar. 13 and 20, 1924, pp. 207-210 and 235-237, 19 figs. Modern conditions and tendencies; organization of labor conditions; discusses cast iron, semi-steel, malleable iron, and cast steel castings; molding sands; non-ferrous metals castings; production of a cast-iron cylinder.

Modern Automobile Foundry Practice, P. Pritchard. Foundry Trade Jl., vol. 29, nos. 392, 393, 394, and 395, Feb. 21, 28, Mar. 6, and 13, 1924, pp. 158-161, 169-172, 191-194, and 215-218, 33 figs. Also Automobile Engrs., vol. 14, no. 187, Mar. 1924, pp. 84-91, 22 figs. Underlying principles; sand molds; molding machines; aluminum, its melting and molding, and defects which have to be overcome in founding; aluminum die-casting; cast iron, its melting and molding; coremaking; cylinder casting; mild steel castings; non-ferrous foundry practice; etc.

Studebaker Opens New Shop, P. Dwyer. Foundry, vol. 52, no. 21, Nov. 15, 1924, pp. 888-893 and 903, 13 figs. Detailed practice in connection with making molds and cores by hand and on various types of machines; cleaning room.

Economy in. Economy in Foundry Practice, E. H. Browne. Foundry Trade Jl., vol. 30, no. 412, July 10, 1924, pp. 38-40. Discusses monotony in foundry practice, case of patternmaker, management, layout of foundry, equipment, care of plant, provision of molding tools, design, patterns, molding and melting.

Falkirk, Scotland. Falkirk Uses New Methods, H. C. Estep. Foundry, vol. 52, no. 9, May 1, 1924, pp. 331-339 and 363, 14 figs. How bath tubs, telegraph-poles bases and other castings are made in old Scotch foundry using modern American machinery.

Feeders and Denseners in. Relative Values of Feeders or Denseners in Grey Iron and Malleable Iron, E. Longden. Foundry Trade Jl., vol. 29, no. 386, Jan. 10, 1924, pp. 29-33 and (discussion) Jan. 17, 1924, pp. 48-49, 46 figs. Results of experiments; comparison of merits of feeders and denseners, and comparison between white and gray iron treated in same way and poured into same form of mold; evidence showing effect of gases in producing unsoundness principally in gray iron.

German Practice. German Foundry Practice, Werner. Metal Industry (Lond.), vol. 25, no. 2, July 11, 1924, pp. 38 and 43. See also Foundry Trade Jl., vol 30, no. 421, Sept. 11, 1924, pp. 229-230 and (discussion) 230 and 232. Shurmann cupola; comparison of Shurmann with standard cupola; pearlitic cast iron; anealing cast iron; utilizing bad metal. Abridged report of paper and discussion at Int. Foundry Trades Exhibition, Eng.

Magnesium, Use of. Magnesium and Its Use in Foundry Work (Das Magnesium und seine Verwendung in der Giesserei). Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 11-12, Mar. 22, 1924, pp. 25-26. Use of magnesium in metal industry is generally based on its great affinity to oxygen and to high temperatures it produces when it burns. Used to advantage in casting of aluminum as it deoxidizes any traces of aluminum oxide and improves cast metal in many ways. Also used in copper, brass, bronze, and mixed foundries as a valuable deoxidizer.

Metal Melting, Fuels for. Melting by Natural-Draught Gas and Other Fuels, A. J. Smith. Brass Wld., vol. 20, no. 3, Mar. 1924, pp. 93-94. Results obtained in foundries with different fuels.

Metallurgy. History of Foundry Metallurgy. Metal Industry (Lond.), vol. 24, no. 4, Jan. 25, 1924, pp. 83-84. Traces development of basis of modern iron-foundry metallurgy, leading up to present-day opinions as to grading of pig irons.

Modern Practice. Evolution of the Iron Trade and its Relation to Foundry Practice, J. I. Coleman. Foundry Trade Jl., vol. 30, no. 424, Oct. 2, 1924, pp. 287-289. Notes on cupola practice; sand; mechanical appliances; gating and running of molds.

Recent Evolution in Foundry Practice (Evolution récente de la fonderie), E. Ronceray. Revue de Métallurgie, vol. 21, nos. 1, 2, and 3, Jan., Feb., and Mar., 1924, pp. 4-11, 112-120, and 183-194, 16 figs. Jan.: General progress; semi-steel; fuels; American malleable; light metals; melting apparatus; heating furnaces. Feb.: Molding and casting; dry-sand and chill casting; molding machines. Mar.: Core and patternmaking; general layout of foundries.

Problems. Some Foundry Problems, A. H. Mundey. Foundry Trade Jl., vol. 29, no. 387. Jan. 17, 1924, pp. 58-61 and (discussion) 61-62. Deals with melting problems, non-ferrous alloys, heat treatment of gunmetal, die casting, bell and brass founding, mold facings, high-tensile brasses. beta brass, etc.

Quantity Production. Practical Problems from the Foundry and Pattern Shop (Praktische Betriebsfragen aus der Giesserei und der Modellwerkstatt), König. Giesserei-Zeitung, vol, 21, no. 7, Apr. 1, 1924, pp. 121-124, 8 figs. Quantity production, for example, of electric-motor housings, by means of molding machines with use of green-sand cores.

Thermit, Application of. Application of Thermit in Foundry Practice. West. Machy. World, vol. 15, no. 1, Jan. 1924, pp. 29-30, 1 fig. For increasing temperature of iron and steel, and making semi-steel in ladle; use in riser; titanium thermit cans for purifying iron and steel; method of making steel castings by thermit process.

IRON INDUSTRY

Canada. Iron and Steel Industry in Canada, C. S. Cameron. Iron & Steel of Canada, vol. 7, no. 10, Oct. 1924, pp. 195-204, 3 figs. Gives progress of iron and steel industry in Canada. Abstract of paper read before Empire Min. & Metallurgical Congress, London.

See also IRON AND STEEL, Canadian Industry.

Orange County, N. Y. Orange County Ironmaking, E. C. Kreutzberg. Iron Trade Rev., vol. 75, nos. 3 and 5, July 17 and 31, 1924, pp. 157-160 and 284-288, 8 figs. History of iron industry of Orange County, N. Y. District was principal producer in New York State in Seventies. Historic chain made at Sterling Iron Works.

Power in. Power in the Iron and Steel Industry, B. R. Shover. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 452-456. Data and estimates from which deductions are made as to present and probable future tendency of power generation and application in iron and steel industry.

Sweden. The Swedish Iron and Lumber Industry (Die schwedische Eisen- und Holzindustrie), H. von Eckermann. Zeit. des Vereines deutscher Industrie, vol. 68, no. 14, Apr. 5, 1924, pp. 330-334, 5 figs. Importance of charcoal for production of iron and recovery of by-products; extent of iron-ore deposits and purity of Swedish ore; production and export; forestry and lumber industry; sawmills, waste-wood industry, and lumber transportation.

IRON METALLURGY

Developments, 1923. Iron and Steel Metallurgy in 1923, C. E. MacQuigg. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 77-78 and 91-93. Review of literature on developments in fuels and furnaces, iron and steel, alloys and castings; value of research. Bibliography.

Direct-Production Process. Direct Production of Iron From Ore by Electric Process (Direkt järnframställning ur malm på elektrisk väg), A. Grönwall. Teknisk Ukeblad, vol. 71, no. 2, Jan. 11, 1924, pp. 21-22, 1 fig. Description of method in which distintegrated ore is carried in succession to electrically-heated rotary furnaces and then to a melting furnace where a soft iron is produced.

Electric Smelting. Electric Smelting of Iron Ore (Statens forsöksdrift med elektrisk jernmalmsmeltning 1922-23), H. Batt. Teknisk Ukeblad, vol. 71, no. 7, Feb. 15, 1924, pp. 67-69. Historical review of development of electric smelting of iron ore in Norway, with special reference to results recently obtained in experiments performed by Norwegian government.

Electric Smelting of Iron Ore in Norway (Statens forsöksdrift med elektrisk jernmalmsmeltning 1922-23), G. Tysland. Teknisk Ukeblad, vol. 71, nos. 28 and 29, Aug. 23 and 30, 1924, pp. 246-247 and 251-255, 20 figs. New type of furnace was developed in which charcoal is replaced by coke; development of electric coke furnace, patented by C. W. Soderberg, making use of "continuous electrodes"; report of results obtained with this furnace.

Manufacture of Pure Iron. Commercially Pure Iron. Gas Engr., vol. 40, no. 573, Jan. 1924, pp. 4-5, 2 figs. Purification of ingot iron; danger of fracture, and resistance to corrosion.

Reduction from Ore at Low Temperatures. The Reduction of Iron from its Ores at Low Temperatures, J. K. Smith. Foundry Trade Jl., vol. 29, no. 398, Apr. 3, 1924, pp. 280-282. See also Iron & Coal Trades Rev., vol. 108, no. 2928, Apr. 11, 1924, p. 590. Product of blast furnace, energy distribution, functioning of furnace, heat balance considerations, absence of nitrogenization, etc.

Smelters, Oil-Fired. Practical Results of Iron Smelting in an Oil-Fired Smelter without Crucible [Einige Betriebsergebnisse von Eisenschmelzen in einen tiegellosen Schmelzofen mit Oelfeuerung (Bauart Hetsch)], G. H. Zirker. Giesserei-Zeitung, vol. 21, no. 3, Feb. 1, 1924, pp. 41-45, 1 fig. Describes design of smelter and its oil burner and gives working results obtained from eight iron smelters with steel addition.

Sponge-Iron Production. A Process for the Production of Sponge Iron, C. E. Williams, E. P. Barrett and Bernard M. Larsen. U. S. Bur. Mines —Reports of Investigations, no. 2578, Feb. 1924, 5 pp., 1 fig. on supp. plate. Description of process developed by Northwest Experiment Station of Bur. Mines in coöperation with Univ. Wash., Seattle; cost data; uses of sponge iron.

IRON MINES

Electrification. See Minnesota.

Italy. Frigido Copper and Iron Mine (La miniera di rame e ferro del Frigido), L. Monetti. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 1, July 15, 1924, p. 11. Discusses reopening of mine, new seams to work, analysis of iron, copper, and lead ores.

Minnesota. Operations of the Mesabi Iron Co., A. B. Parsons. Eng. & Min. Jl.-Press, vol. 117, nos. 4 and 5, Jan. 26 and Feb. 2, 1924, pp. 157-164 and 202-210, 24 figs. History; mining; economics; crushing, concentrating, and sintering of ore.

The First Complete Electrification of an Open-pit Iron-ore Mine in Minnesota, R. S. Walker. Gen. Elec. Rev., vol. 27, no. 9, Sept. 1924, pp. 580-591, 17 figs. Outline of Lake Superior iron ore region, with particular reference to Mesabi Range, and general résumé of open-pit method of mining. Description of electrical equipment of Wabigon open-pit mine, located at Buhl, Minn., on Mesabi Range, which is being electrified, giving specifications and operating costs.

New Brunswick, Canada. Bathurst Iron Mine, C. S. Parsons. Can. Min. Jl., vol. 45, no. 49, Dec. 5, 1924, pp. 1193-1194, 1 fig. Description of mine in New Brunswick, County of Gloucester, Canada.

Roof Support. Roof Support in the Red Ore Mines of the Birmingham District (Alabama), W. R. Crane. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1359-M, Sept. 1924, 39 pp., 45 figs. and (abstract) in Min. & Metallurgy, vol. 5, no. 215, Nov. 1924, pp. 546-547. Conditions affecting support; methods of roof support; failure of roof or top rock and of pillars; results of study of roof support.

Spain. The World's Oldest Iron Mine in Spain, C. De Kalb. Mfrs. Rec., vol. 85, no. 13, Mar. 27, 1924, pp. 83-87, 8 figs. Discusses history of mine, and iron and steel developments under way; to be center of great metallurgical development with American electrical equipment.

IRON MINING

Africa. Iron Mining in Northern Africa, A. Grenon. Compressed Air Mag., vol. 29, no. 4, Apr. 1924, pp. 845-847, 8 figs. Describes Djebel-Djerissa mines; composition of ore; mining equipment and methods.

Alabama. Red Iron Ore Mining Methods in the Birmingham District, W. R. Crane. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1368-M, Sept. 1924, 33 pp., 20 figs. and (abstract) in Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 501-503, 1 fig. History and development of district, geology and mineralogy of ore, and detailed description of mining methods employed. Pub. by permission U. S. Bur. Mines.

Straight Line Production. F. J. Crolius. Coal Industry, vol. 7, no. 6, June 1924, pp. 224-230, 6 figs. Iron mining at Woodward Iron in Birmingham, Ala., district; Clinton hard and soft ores; system of mining, production and consumption of iron; brown ore; haulage and power; transportation.

Methods. Straight Line Production, F. J. Crolius. Blast Furnace & Steel Plant, vol. 12, nos. 5 and 6, May and June 1924, pp. 226-232 and 264-267 and 305, 11 figs. Practice at Woodward Iron in Birmingham, Ala., district; chemical composition of ores; mining system; production and consumption of iron ore; typical installations; Crockard furnace top; pig bed machines.

Michigan. Mining Methods at the Cliffs Shaft Mine, L. Eaton. Explosives Engr., vol. 2, no. 2, Feb. 1924, pp. 37-40, 8 figs. Ore at this mine is a hard specular hematite; room and pillar method used; floors mined by underhand stoping; backstoping employed for some orebodies; drilling and blasting methods.

IRON ORE

[See also IRON DEPOSITS.]

Beneficiation. See Canada; Low-Grade.

Canada. Beneficiation Tests, W. B. Timm. Can. Min. Jl., vol. 45, no. 20, May 16, 1924, pp. 481-483. Results of experimental tests on beneficiation of Canadian iron ores.

The Iron Ore Report. Can. Min. Jl., vol. 45, no. 7, Feb. 15, 1924, pp. 154-156. Extracts from report of Ontario Iron Ore Committee, appointed

to investigate extent and quality of deposits of low-grade iron ores in Ontario, best commercial methods of beneficiating them, and generally what steps or measures should be adopted to enable low-grade and other iron ores of this Province to be utilized in production of pig-iron and steel.

See also Minnesota.

Concentration. Iron Ores, the Basis of Iron Production (Die Eisenerze als Grundstoffe der Eisenerzeugung), J. Ferfer. Bergbau, vol. 37, no. 18, Sept. 4, 1924, pp. 493-500. Evaluation of iron ores; manganese and phosphorus content; most important iron ores and their metallurgical treatment; gives list of German ores with analyses.

Desulphurization of Pyrites. The Desulphurization of Iron Pyrites, F. C. Thompson and N. Tilling. Chem. & Industry, vol. 43, no. 9, Feb. 29, 1924, pp. 37T-46T, 13 figs. Experimental determination of effect of various common gases and gas mixtures upon desulphurization of pyrites at different temperatures; and determination of vapor pressures of sulphur dioxide, sulphur trioxide, and oxygen during oxidation of iron pyrites.

Direct Reduction. Studies Direct Reduction of Ore. Iron Trade Rev., vol. 74, no. 25, June 19, 1924, pp. 1635-1636, 1 fig. Nodular product obtained by treating high or low-grade iron ore in series of rotary kiln is converted into wrought iron and steel; physical and chemical characteristics; experiments carried out at demonstration plant built by Hornsey Iron Co., England.

See also IRON METALLURGY, Direct Production Process.

Germany. Origin of Iron Manganese Ores in the Spessart and Odenwald (Die Entstehungsweise der Eisenmanganerze im Zechstein von Spessart und Odenwald), K. Hummel. Glückauf, vol. 60, no. 35, Aug. 30, 1924, pp. 765-768. Discusses geology and tectonics of Dyas or Permian system.

Hematite. Notes on the Origin of Clinton Hematite Ores, G. W. Stose. Economic Geology, vol. 19, no. 5, Aug. 1924, pp. 405-411, 5 figs. Discusses origin of Clinton hematite ores of New York and Appalachians and concludes Irondale Mine formation was in part deposited originally as carbonate of iron, etc.

Lake Superior District. Future of Lake Ore Outlined, M. C. Lake. Iron Trade Rev., vol. 75, no. 26, Dec. 25, 1924, pp. 1701-1705, 2 figs. Depletion of reserves of merchantable material in sight; annual shipment of 75,000,000 tons in 10 years indicated.

Low-Grade, Mesabi Range. The Development of Low Grade Iron Ores on the Mesabi Range, W. G. Swart. Minn. Federation of Architectural & Eng. Soc.—Bul., vol. 9, no. 6, June 1924, pp. 11-14. Discusses use and beneficiation of low-grade ores.

Low-Temperature Reduction. Low Temperature Reduction of Iron Ore, J. Kent Smith. Iron Age, vol. 113, no. 14, Apr. 3, 1924, pp. 1003-1006. Direct processes and blast furnace; CO as factor in both; metallurgical, thermal and fuel conditions compared.

Magnetite. Commercial Possibilities of the Magnetite Slates of the Cuyuna Range, G. A. Thiel. Eng. & Min. Jl.-Press, vol. 118, no. 19, Nov. 8, 1924, pp. 735-738, 7 figs. Outlines occurrence of magnetite-bearing formations, their relations to intrusive igneous rocks of region, and bearing of microstructure of ore on possibility of magnetic concentration. Pub. by permission of Minn. Geol. Surv.

On the Electrical Conductivity of Magnetite, E. Wilson and E. F. Herroun. Roy. Soc.—Proc., vol. 105, no. A731, Mar. 1, 1924, pp. 334-345, 3 figs. Deals with electrical conductivity of certain varietites of magnetite as affected by impressed voltage, temperature, compressive stress, and magnetization.

The Smelting of Magnetite, B. Stoughton. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 594-596. Reasons why smelting of magnetite is more costly than that of hematite.

Minnesota. Iron Sulphides in Magnetic Belts near the Cuyuna Range, G. A. Thiel. Economic Geology, vol. 19, no. 5, Aug. 1924, pp. 466-472, 1 fig. Discusses occurrence of numerous lenses of magnetite slates, geology of Long Lake region, pyrrhotite in Lake Superior region, paragenesis of iron sulphides, etc.

Minnesota and Ontario, C. P. McCormack. Iron & Steel of Canada, vol. 7, no. 4, Apr. 1924, pp. 66-67 and 77-78, 1 fig. Particulars of attempt being made to beneficiate low-grade magnetite of Babbitt, Minn., giving details of ore occurrences, conditions and description of plant, and application to Ontario ores where problem is similar.

Purification. Purifying Iron Ore by Chemical Methods, A. J. Moxham. Iron Age, vol. 113, no. 23, June 5, 1924, pp. 1637-1639. Results of work on Delaware green sands, using acid leach with subsequent washing for separation of iron, potash, and alumina.

Reduction. Comparative Investigations as to Permeability to Gas, Porosity, Compression Strength and Velocity of Reduction of Iron Ores (Vergleichende Untersuchungen über die Gasdurchlässigkeit, Porosität, Druckfestigkeit und Reduktionsgeschwindigkeit von Eisenerzen), F. Wüst and P. Rütten. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 5, 1924, pp. 1-12, 10 figs. Shows that velocity of reduction is dependent mainly on physical structure of ore and in first place on its permeability to gas and its porosity.

Time Element in Iron Ore Reduction, P. H. Royster, T. L. Joseph and S. P. Kinney. Blast Furnace & Steel Plant, vol. 12, no. 5, May 1924, pp. 246-250, 7 figs. Series of experimental determinations which suggest very low volume of efficiency of reduction. Published by permission of U. S. Bur. Mines.

Silica Content, Effect of. How Silica Affects Cost of Iron, T. T. Read, T. L. Joseph and P. H. Royster. Iron Trade Rev., vol. 74, no. 4, Jan. 24, 1924, pp. 288-291, 2 figs. Great variation shown in values of iron ore; method suggested for scientific determination, according to results obtained in furnaces.

Sweden. Marketing Possibilities of Swedish Iron Ore (Avsättningsmöjligheter för den svenska järnmalmssligen), E. Fornander. Jernkontorets Annaler, vol. 108, Tekniska Diskussionsmötet, May 31, 1924, pp. 11-35, 3 figs. Statistics of Swedish iron ore production; consumption by Swedish steel mills and in briquetting plants; statistics of Swedish ore exports.

Vanadium in. Occurrence of Vanadium in Iron Ores, Its Action During the Metallurgical Processes and the Possibility of Its Extraction (Om vanadinens förekomst i järnmalmer, dess förhållande vid de järnmetallurgiska processerna samt möjligheterna för dess tillgodogörande), R. von Seth. Jernkontorets Annaler, vol. 108, no. 11, 1924, pp. 561-583. Vanadium occurs in German and French slags, English pig iron, iron ores in United States, Canada, Norway and Sweden. Is easily reduced in blast furnace and easily oxidized in Bessemer or basic process. Proposes to extract vanadium from slag obtained during early part of latter processes, particularly from basic process.

Volumetric Determination of Iron. Volumetric Determination of Iron by Titanous Chloride Method of Knecht and Hibbert (Ueber die massanalytische Eisenbestimmung mit Titantrichlorid nach Knecht und Hibbert), L. Brandt. Chemiker-

Zeitung, vol. 48, nos. 51 and 52, Apr. 26 and 29, 1924, pp. 265-266 and 270-271. Determination of iron in ores by titration of hydrochloric-acid solution of ore with titanous chloride solution gives results equally as accurate as those obtained by permanganate method, and can be carried out more rapidly; under described conditions copper is determined quantitatively together with iron; antimony, vanadium, and platinum cause high results, and cobalt and chromium interfere only if present in sufficient amount for color of their solutions to mask end point.

World Reserves. Iron Ore Reserves, O. R. Kuhn. Iron Age, vol. 114, nos. 19 and 20, Nov. 6 and 13, 1924, pp. 1204-1205 and 1248-1249, and 1285-1287, 3 figs. Nov. 6: Reserves of world which may be smelted in American furnaces; United States reserves should last 250 years. Nov. 13: Reserves of Eastern Hemisphere, with particular reference to sources which ultimately may become available for smelting in American furnaces.

World's Resources. Estimating Iron Ore Resources. Iron Trade Rev., vol. 75, no. 24, Dec. 11, 1924, pp. 1568-1569, 2 figs. World's actual supply sufficient for 76 years; potential tonnage to be exhausted by year 2200; amount available compared with increasing rate of consumption of pig iron.

IRON, PIG

Carbon Content. See STEEL, Carbon-Content Determination.

Characteristics and Uses. Characteristics that Chemical Analysis Fails to Disclose in Pig-Iron and Castings, W. E. Jominy. Foundry Trade Jl., vol. 30, no. 428, Oct. 30, 1924, pp. 371-376, 16 figs. See also Metal Industry (Lond.), vol. 25, no. 18, Oct. 31, 1924, p. 432, 2 figs. Results of author's examination of pig-iron samples over period of four months from five different blast furnaces; gives comparative strengths of irons produced from coke furnaces and those from charcoal furnaces. (Abstract.) Paper read before Am. Foundrymen's Assn.

Pig-Iron: Its Characteristics and Uses, H. Field. Foundry Trade Jl., vol. 29, no. 402, May 1, 1924, pp. 353-358, 1 fig. Elementary paper having the object to help foundry worker understand why there are "brands" of iron, why one brand is preferred to another, why pig-iron should be carried the length and breadth of the country, and why various castings in foundry are cast from different mixtures.

Charcoal, Manufacture of. The Mysore Distillation and Iron Works Design and construction, J. P. Carmody. Mysore Engrs.' Assn. Bul., vol. 1, no. 1, July-Sept. 1923, pp. 23-72. Description of works located at Bhadravati on Bhadra River, British India, including saw-mill, carbonizing, distillation, ore-crushing, and blast-furnace plants, power house and electrical equipment, and boiler house. Crude methyl alcohol, acetate of lime, tar and light oils are recovered from pyroligneous acid.

Coke and Charcoal. Coke and Charcoal Irons Differ, W. E. Jominy. Iron Trade Rev., vol. 75, no. 16, Oct. 16, 1924, pp. 1023-1025 and 1027, 2 figs. Chemical analyses fail to disclose certain characteristics in pig irons and castings; charcoal iron shows decided increase in physical properties on remelting; results of tests. (Abstract.) Paper presented before Am. Foundrymen's Assn.

Electric Smelting. See ELECTRIC FURNACES, Iron-Ore Reduction; Pig-Iron.

Foundry. Fusion Materials in the Iron Foundry (Schmelzstoffe in der Eisengiesserei), M. Engelen. Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 21, May 24, 1924, pp. 141-143. Discusses hematite pig, foundry pig and Luxemburg pig, their compositions; special pig, etc.

French, Characteristics. French Pig Iron Characteristics Defined, V. Truant. Iron Age, vol. 114, no. 19, Nov. 6, 1924, pp. 1243-1244. Phosphoric and hematite irons of varying compositions used for different purposes; analyses of several grades.

Grading and Mixing. Grading and Mixing of Pig Irons. Metal Industry (Lond.), vol. 25, nos. 7 and 8, Aug. 15 and 22, 1924, pp. 155-156 and 179-180. Discusses American method of grading by analysis; noteworthy changes in American opinion as to completely chemical grading; difficulties of complete chemical limits; influence of melting conditions difficult of complete explanation on chemical basis; accuracy of analyses; scope of analytical control, scope of control by fracture; graphite condition and thermal influences, and chilling.

See also IRON FOUNDING, Metallurgy.

Judging and Mixing. The Judging and Mixing of Pig-Iron, H. J. Young. Metal Industry (Lond.), vol. 25, no. 10, Sept. 5, 1924, pp. 227-228. Author's reply to the various criticisms of his recent paper by above title.

Machine-Construction. The Development of Species of Pig Iron for Machine Construction (Ueber die Entwicklung der Gusseisensorten für den Maschinenbau), H. Koch. Schweizerische Bauzeitung, vol. 83, no. 22, May 31, 1924, pp. 251-254, 5 figs. Discusses properties of different alloy components, from which it is evident that through suitable additions and control of cooling speed, graphite quantity and properties of pig iron can to certain extent be regulated.

Manufacture. Physical Changes in Pig Iron due to Primary Temperatures, Metal Industry (Lond.), vol. 24, no. 9, Feb. 29, 1924, pp. 203-205, 3 figs. Influence of blast-furnace temperature and related factors on structure of resulting pig iron.

Oxygen, Use in Production of. Oxygen in Pig Iron (Några tankar om syre i tackjärn), J. A. Leffler. Jernkontorets Annaler, vol. 108, no. 3, 1924, pp. 149-177, 4 figs. Superiority of charcoal as a deoxidizer is claimed to be one of the main reasons for superiority of charcoal iron over coke iron. Analyses of Swedish charcoal iron as compared to German and English coke iron show also the very low contents of sulphur and phosphor of charcoal iron as compared to the much higher contents of these elements in coke iron.

The Use of Oxygen and Oxygenated Air in the Production of Pig Iron (Die Verwendung von Sauerstoff und sauerstoffreicher Luft bei der Roheisenerzeugung), R. Schenck. Stahl u. Eisen, vol. 44, no. 19, May 8, 1924, pp. 521-526, 3 figs. Reviews previous works and discusses phenomena in blast furnace and effect on them of nitrogen-free air and oxygen enrichment; summary of advantages to be gained by use of pure oxygen.

Pig-Casting Machine. La Follette Improvements. Iron Age, vol. 113, no. 19, May 8, 1924, p. 1353. See also Iron Trade Rev., vol. 74, no. 21, May 22, 1924, pp. 1368-1369, 2 figs. Single-strand pig-iron casting machine installed at blast furnace; improvements to other departments.

Production Cost, Effect of Silica in Ore on. The Effect of Silica in Iron Ore on Cost of Pig Iron Production, T. T. Read, T. L. Joseph and P. H. Royster. U. S. Bur. Mines—Reports of Investigations, no. 2560, Jan. 1924, 10 pp., 2 figs. on supp. plate. Results of investigation.

World Production. Pig Iron and Steel Output of the World, Edwin F. Cone. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 70-78, 3 figs. Two pre-war and five post-war years compared; steel production exceeds 1913; exports still below pre-war.

IRON AND STEEL

Austrian Industry. Austrian Iron and Steel Industry and Trade, E. M. Zwickel. Trade Information Bul. (Supp. to Commerce Reports), no. 265, Sept. 1, 1924, 19 pp. Information relating to production, prices, foreign trade, and market conditions of industry in 1923, and production and price data for first half of 1924; discussion of cartels and conventions, coal supply, labor, and freight rates; account of Alpine Montangesellschaft, largest Austrian iron and steel concern.

Bibliography, 1923. Review of Iron and Steel Literature for 1923, E. H. McClelland. Forging —Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 5-9. Classified list of more important books, serials and trade publications during year, with few of earlier date, not previously announced.

Body. "Body," J. K. Smith. Foundry Trade Jl., vol. 30, no. 416, Aug. 7, 1924, pp. 112-113. Popular definition of "body." Functions of blast furnace; puddling process and body; relationship between nitrogen and body.

British Industry. British Iron and Steel Industry, F. W. Harbord and E. F. Law. Iron & Coal Trades Rev., vol. 108, no. 2937, June 13, 1924, pp. 1011-1012. Review of improvements and advances made during last 70 years, and salient features of industry in principal producing districts. From paper read at Empire Mining and Metallurgical Congress.

Some Economic Considerations Affecting the Iron and Steel Industry, W. J. Larke and M. S. Birkett. Iron & Coal Trades Rev., vol. 108, no. 2937, June 13, 1924, pp. 1012-1014. See also Iron Trade Rev., vol. 74, no. 26, June 26, 1924, pp. 1697-1700 and 1702. Outlines present position of British iron and steel industry, together with some indication of probable lines of development in future. From paper read at Empire Mining and Metallurgical Congress.

Canadian Industry. Canadian Iron and Steel Industry and Trade, G. E. Phoebus. Trade Information Bul. (Supp. to Commerce Reports), no. 285, Nov. 1924, 12 pp. Canadian producers have been encouraged by establishment of governmental bounties in certain provinces; particulars of these efforts. Detailed statistics of Canadian iron and steel works, production of primary iron and steel products within Dominion, movement of iron ore and consumption of raw materials, and outgoing and incoming shipments of iron and steel.

The Iron and Steel Industry in Canada, C. S. Cameron. Iron & Coal Trades Rev., vol. 108, no. 2936, June 6, 1924, pp. 971-974. See also Engineer, vol. 138, nos. 3578 and 3579, July 25 and Aug. 1, 1924, pp. 112-113, and 128-129. Data regarding different steel works. Confines attention to fundamental processes, smelting of ore and production of primary forms of steel and those made directly from them, such as merchant bars, structural shapes, rails, plates, wire rods, and generally those that are sent from works of origin to others for further fabrication. From paper read at Empire Min. and Met. Congress.

The Iron and Steel Industry of the Dominion, C. S. Cameron. Can. Machy., vol. 32, nos. 8 and 9, Aug. 21 and 28, 1924, pp. 22-23 and 22-23. Brief outline of history of industry in Canada from its inception to present day with particular emphasis on its growth as factor in prosperity.

Chemical Specifications. Interpretation of Chemical Specifications for Iron and Steel in Relation to Analytical Accuracy, C. H. Ridsdale. Iron & Coal Trades Rev., vol. 108, no. 2923, Mar. 7, 1924, pp. 382-383. See also Iron & Steel Engr., vol. 7, no. 7, July 1924, pp. 130 and 133 and Chem. News, vol. 128, no. 3348, June 13, 1924, pp. 375-380. Abstract of paper read at joint meeting of Cleveland Instn. Engrs., Newcastle Sec. Soc. Chem. Industry, and Inst. of Chemistry.

Corrosion. Prevention of Corrosion of Iron and Steel, C. P. Perin. Engrs. & Eng., vol. 41, no. 8, Aug. 1924, pp. 223-225. Gives diagram showing causes external and those inherent in metal, general theory and prevention of corrosion.

The Submerged Corrosion of Iron, W. G. Whitman and R. P. Russell. Chem. & Industry, vol. 43, nos. 26 and 27, June 27, July 4, 1924, pp. 193T-196T and 197T-199T, 4 figs. Discusses corrosion under natural water and solutions of alkali and non-oxidizing acids and its explanation along electrochemical lines.

Fatigue. Fatigue Phenomena and Endurance Tests (Ermüdungserscheinungen und Dauerversuche), R. Mailänder. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Werkstoffausschuss, report no. 38, Mar. 15, 1924, 27 pp. Determination of working strength; shortened endurance tests; machines and devices for endurance tests; fracture and its appearance; different kinds of stress; influence of heat treatment, composition and structure. Bibliography.

German Industry. The Position of the German Iron and Steel Industries in Post-War Europe, C. J. Kavanagh. Iron & Coal Trades Rev., vol. 108, nos. 2937 and 2938, June 13 and 20, 1924, pp. 1025 and 1072-1073. New German combinations; iron ore supplies and production; export trade; French regrouping; coal resources and production; Franco-German collaboration.

History. Notes on the History of Iron and Steel, G. E. Trackray. Am. Soc. Steel Treating—Trans., vol. 6, no. 4, Oct. 1924, pp. 443-490. Compilation of some of salient points of history; notes were selected from various records, writings, researches, investigations by archaeologists, and others.

Indian Industry. India's Iron and Steel Industry, H. M. S. Tuckwell. Iron & Coal Trades Rev., vol. 108, no. 2939, June 27, 1924, pp. 1123-1125. Data regarding Tata Iron & Steel Co., Bengal Iron Co., Indian Iron & Steel Co., United Steel Corporation of Asia, and Mysore Ironworks; present position and future prospects.

Industrial Possibilities, British Columbia.—Possibilities for an Iron and Steel Industry in British Columbia, C. P. W. Schwengers. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 589-593. Subject is approached from view points of business man rather than from that of technologist.

Italian Foreign Trade, 1923. Italy's Foreign Trade in Iron, Steel and Nonferrous Metals in 1923, A. A. Osborne. Trade Information Bul. (Supp to Commerce Reports), no. 237, June 2, 1924, 6 pp. Details of importation of iron, steel, and non-ferrous metals from France, Germany, Great Britain, Switzerland, and United States. Trade in aluminum, and data pertaining to the various iron and steel products imported during 1922 and 1923.

Italian Industry. The Technical and Economic Fundamentals of the Italian Iron and Steel Industry, with Special Regard to the Production of Electric-Steel Castings (Die technischen und wirtschaftlichen Grundlagen der italienischen Eisen- und Stahlindustrie, namentlich der Erzeugung von Elektrostahl-Formguss), H. Hermanns. Giesserei-Zeitung, vol. 21, no. 17, Sept. 1, 1924, pp. 357-378, 31 figs. General status of industry; heat and power supply; features of steel works and foundries; construction of furnaces and smelters; equipment and operation of steel foundries.

Magnetic Aging. The Magnetic Ageing of Iron and Steel, Thos. E. Green. World Power

(formerly Beama), vol. 1, no. 1, Jan. 1924, pp. 41-43. Aging of transformer and similar cores; aging or maturing of permanent magnets.

Magnetic Analysis. The Present Status of Magnetic Analysis, R. L. Sanford. Am. Soc. for Steel Treating—Trans., vol. 5, no. 6, June 1924, pp. 577-589. Makes reference to the numerous types of testing equipment which have been developed in study of special shapes and types of material, and reviews history of magnetic studies of various investigators. Points out advantages and disadvantages of this method of testing and makes a plea for more scientists to enter this field of investigation. Bibliography.

Pacific Coast, U. S. Iron and Steel on the Pacific Coast, C. E. Williams. Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, pp. 23-25. Local demand and production; foreign pig iron being imported in preference to eastern United States products; raw materials supply; smelting methods; sponge iron.

Painting. Preparation of Iron and Steel Surfaces for Paint. Ry. Rev., vol. 75, no. 5, Aug. 2, 1924, pp. 166-173, 15 figs. General résumé of tests conducted by Am. Soc. for Testing Matls. furnishes valuable information on car maintenance.

Pickling. Pickling of Iron and Steel; A Bibliography, V. S. Polansky. Blast Furnace & Steel Plant, vol. 12, nos. 7, 8, and 9, July, Aug., and Sept. 1924, pp. 326-328, 368-371, and 431-434. See also Forging—Stamping—Heat Treating, vol. 10, nos. 7, 8, and 9, July, Aug., and Sept. 1924, pp. 267-269, 298-301, and 350-354. Contains articles on machines and equipment, pickling in acid solutions, pickling in salt solutions, electrolytic pickling, inhibitors and accelerators, effect of pickling, recovery of spent liquors, etc.

Russian Industry. Russian Mining and Iron and Steel Industries in 1914 to 1922. Iron & Coal Trades Rev., vol. 108, no. 2922, Feb. 29, 1924, pp. 348-349. Production, export and import statistics. From Bul. 3773 of Comité des Forges de France.

Statistics. Iron Ore, Pig Iron and Steel in 1922, E. F. Burchard and H. W. Davis. U. S. Geol. Surv.,-No. I:21, Jan. 25, 1924, pp. 341-376, 4 figs. Statistics on production, stocks, prices, imports and exports, etc.

Strength at High Temperatures. The Strength Properties of Wrought Iron, Mild Steel and Nickel Steel at High Temperatures, H. Carrington. Engineering, vol. 117, no. 3029, Jan. 18, 1924, pp. 69-71, 13 figs. Describes research, which is to some extent repetition of Martens' work, but which includes, in addition, relations between Sankey test properties, Poisson's ratio and temperature for the three materials.

Temperature, Effect on. Effect of Temperature on Metals. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 801-803, 3 figs. Review of data on irons and steels. Presented before joint meeting of A. S. M. E. and A. S. T. M.

Terminology. Iron and Steel Terminology, H. D. Hibbard. Min. & Metallurgy, vol. 5, no. 206, Feb. 1924, pp. 77-78, Clarifies use of terms often occurring in writings on iron and steel, and suggests several new short abbreviated names for some of the things related to subject which now are indicated by phrases.

Trade of Great Britain. The Iron and Steel Trade in 1923. Iron & Coal Trades Rev., vol. 108, no. 2914, Jan. 4, 1924, pp. 8-17, 2 figs. District reviews, including pig-iron production, prices, iron ore, manufactured iron and steel, imports and exports, wages, by-product market, etc.

IRONING MACHINES. See LAUNDRY MACHINERY.

IRRIGATION

Alberta, Can. Lethbridge Northern Irrigation District in Alberta, C. M. Arnold and H. G. Cockrane. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 243-248, 8 figs. Internal storage found cheaper than large canals; controlled hydraulic jump utilized in grade-reduction drops.

Canals. Construction of Concrete Lined Irrigation Canals, W. E. Code. Eng. & Contracting (Water Works), vol. 61, no. 6, June 11, 1924, pp. 1314-1316, 1 fig. Methods and costs on two jobs in Arizona. From recent bulletin of Agricultural Experiment Station of Univ. of Ariz.

Measurement of Seepage Losses in Canals, O. V. P. Stout. Agricultural Eng., vol. 5, no. 1, Apr. 1924, pp. 52-53 and 90. Suitable instruments essential. Details of metering as practiced in recent seepage investigations. Measurement of depths in connection with determination of rate of discharge. Selection of inlet and outlet points where water cross-sections of channel are similar will materially further consistency in results of gagings.

Chinese Project. Irrigation in China. Times Trade & Eng. Supp., vol. 13, no. 288, Jan. 12, 1924, p. 438, 1 fig. Large scheme for Shensi Province which has been approved by China Famine Relief Commission.

Corrugation Method. The Corrugation Method of Irrigation. Eng. & Contracting (Water Works), vol. 61, no. 2, Feb. 1924, pp. 359-360. Notes on method well adapted for efficient application of water to steep or irregular slopes.

Dams. See DAMS.

Developments. A Review of the Important Advances in Irrigation since 1900. Agricultural Eng., vol. 5, no. 1 and 2, Jan. and Feb., 1924, pp. 9-11 and 32-34, 1923, report of committee on irrigation based on individual reports; deals with use of water in irrigation; hydroelectric power and irrigation; design of irrigation structures; pumping for irrigation. Feb.: Irrigation law and water rights; irrigation district development; settlement of irrigation enterprises; forecast of future development.

Drainage. See DRAINAGE.

Flumes. See FLUMES.

India. Indian Irrigation Problems, F. W. Woods. Times Trade & Eng. Supp., vol. 14, no. 300, Apr. 5, 1924, p. 95, 2 figs. Hydraulics of surface and sub-soil flow of River Indus and its tributaries.

Ramgarh and Dhil River Irrigation-Works, Jaipur State, Rajputana, Chas. E. Stotherd. Instn. Civ. Engrs.—Sessional Notices, no. 3, Feb. 1924, pp. 76-80, 2 figs. Construction details of the two works. (Abstract.)

The Mysore Irrigation Bill. Mysore Engrs.' Assn.—Bul., vol. 1, no. 2, Oct.-Dec. 1923, pp. 128-146. Legislation recently introduced regulating irrigation work; deals with water courses, supply of water, water rates, construction and maintenance of irrigation works on special terms, compulsory labor on emergencies, customary labor that may be required to be performed by occupiers of lands irrigated by an irrigation or drainage work, penalties, etc.

The Sutlej Valley Irrigation Project in India. Excavating Engr., vol. 18, no. 9, Sept. 1924, pp. 335-339, 14 figs. Describes enormous irrigation project covering area as large as state of New Hampshire and involving as much excavation as that of Panama Canal; discusses scheme of irrigation, construction, system of canals and excavation.

Legislation, U. S. Irrigation and Drainage Laws Critically Reviewed. Eng. News-Rec., vol. 93, no. 20, Nov. 13, 1924, pp. 788-790, 1 fig. U. S.

Dept. of Agriculture reports on land-reclamation policies; subsidies and failure; excess reclamation; future of reclamation.

Northwest Canada. Development of Irrigation in Northwest Canada, P. J. Jennings. Eng. News-Rec., vol. 92, no. 15, Apr. 10, 1924, pp. 616-618, 4 figs. Projects by individuals, companies and groups of farmers; Government supervision.

See also Alberta.

Projects and Policy, U. S. Reclamation Advisers Report on Needs of Projects and Policy for Future Irrigation. Eng. News-Rec., vol. 92, no. 17, Apr. 24, 1924, pp. 726-729. Report rendered by Special Advisers on Reclamation. Original law found ineffective; recommends repayment according to productivity of land; financial and agricultural aid necessary for success.

Pumping Plants. See PUMPING PLANTS, Irrigation.

Recovery of Return and Seepage Waters. Recovery of Return and Seepage Waters in California, T. R. Simpson. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 751-754, 6 figs. Applications for right to divert return flow are frequent; area irrigated with such water is rapidly increasing.

Sewage. Studies of Outlets and Crops on Sewage Irrigated Areas, Geo. A. Mitchell. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 284-287, 9 figs. Terra-cotta pipe lines used and several designs of concrete and concrete-protected cast-iron outlets tried; comparative yields of irrigated and non-irrigated land.

South Africa. A Short History of Irrigation Development in South Africa, C. O. Linscott. S. African Irrigation Mag., vol. 3, no. 2, June 1924, pp. 50-56.

Irrigation in the Union: A Discussion of Policy in Relation to the Conservation of Water, F. E. Kanthack. So. African Instn. Engrs.—Jl., vol. 22, no. 11, June 1924, pp. 174-181. Discusses various schemes of irrigation and conservation of water. So. Africa is handicapped by its distance from rain-producing oceans and is in portion of globe directly between trade and anti-trade winds, position which at times adversely affects seasonal rains.

Van Rynevelds Pass Irrigation Scheme, K. R. Shand. So. African Irrigation Dept. Mag., vol. 3, no. 1, Mar. 1924, pp. 15-20, 3 figs. on supp. plate. Scheme comprises concrete storage dam situated about one mile northwest of Graaff Reinet, 3 pick-up weirs and approximately 60 miles of canals. Length of crest level 1170 ft., crest width 10 ft., crest level, R.L. 2593, outlet level R.L. 2510, estimated quantity of concrete 130,000 cu. yd.

Spain. Irrigation in Spain. Times Trade & Eng. Supp., vol. 13, no. 289, Jan. 19, 1924, p. 466. Plans for regulation of the Segura River, involving extensive afforestation, and provision of four reservoirs, having total storage capacity exceeding 66,000 million gal.

U. S. A. The Movement of Water in Irrigated Soils, C. S. Scofield. Agricultural Research—Jl., vol. 27, no. 9, Mar. 1, 1924, pp. 617-696, 16 figs. Discusses certain aspects of alkali problem in relation to irrigation farming which as a whole relates to soluble salts in soil solution.

Western Section Project. Irrigation Systems, Rob. S. Stockton. Eng. Jl., vol. 7, no. 1, Jan. 1924, pp. 8-12, 7 figs. Engineering features of operation and maintenance with particular reference to Western Section irrigation project.

ISOSTASY

Theory. The Bearing of the Theory of Isostasy on Some Major Geological Problems, Wm. Bowie. Franklin Inst.—Jl., vol. 198, no. 2, Aug. 1924, pp. 181-200, 12 figs. Shows importance of theory to problems of geology. Bibliography.

"The Establishment of Isostasy," J. F. Hayford. West. Soc. Engrs.—Jl., vol. 29, no. 9, Sept. 1924, pp. 350-359 and (discussion) 360-362, 2 figs. Summary of elaborate tests conducted over period of 13 years which have been published by U. S. Coast & Geodetic Survey; describes nature of evidence by which truth of theory was established, together with speculations based upon it; theory is that any column of same cross section at top, say 1 sq. mi., and extending down to depth of compensation, about 70 mi. below sea level, has same total weight as any other such column, anywhere on earth.

ISOTOPY. See ATOMS, Isotopy; Atomic Weights.

J

JACKS

Lifting. See LIFTING JACKS.

JAPANNING

Electric Ovens for. See ENAMELING, Electric Ovens for.

Filing Cases. Japanning Filing Cases, E. C. Cook. Fuels & Furnaces, vol. 2, no. 5, May 1924, pp. 441-445, 6 figs. Notes on cleaning, dipping, and baking practice in japanning department at Yawman & Erbe Mfg. Co., Rochester, N. Y., where all kinds of filing cabinets and safes are made.

Plant. World's Largest Contract Japanning Plant Described, E. C. Cook. Fuels & Furnaces. vol. 2, no. 3, Mar. 1924, pp. 239-244, 5 figs. Method and equipment of plant of Wolverine Enameling Co., Detroit; intermittent conveyor and Curry-type ovens.

JETTIES

Clay-Cargo. New China Clay Jetty at Fowey. Engineer, vol. 137, no. 3556, Feb. 22, 1924, pp. 195-196, 5 figs., partly on p. 202. Jetty is 500 ft. long, has straight frontage of 300 ft., and is 50 ft. wide; has filling of brick arches and concrete, supported on 23 steel cylinders, 6-ft. diam., sunk to rock and afterwards filled with concrete; method of handling clay cargoes.

JIGS

Bevel Gear-Testing. Double Helical Bevel Gear-Testing Jig. Machy. (Lond.), vol. 23, no. 596, Feb. 28, 1924, p. 711, 3 figs. Special jig for testing both accuracy and truth of apex in double helical bevel wheels, as used in automobile back-axle drives.

Clamping Devices for. Swinging-leaf Clamping Devices, F. Server. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 544-546, 7 figs. Hinged cover with equalizing clamp; swing cover adapted for holding bushings; methods of clamping hinged covers; hinge pin with vertical adjustment; hinged-cover fixture for lathe chuck.

Design. See TOOLS, Designing for Production Manufacturing.

JOINTS

Balls and Sockets for, Machining. Machining Balls and Sockets, W. R. Graham. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 284-285, 6

figs. Describes machining of interchangeable cast-steel balls and bronze sockets for use in construction of electric commercial trucks.

Concrete Expansion. Expansion Joints in Concrete. Ry. Engr., vol. 45, no. 530, Mar. 1924. pp. 99-103 and 108, 24 figs. Joints in retaining walls; bridge and wall slabs; reservoir, canal and other watertight joints; expansion joints for bridges and viaducts; structural expansion joints.

Metal-To-Glass. A Metal-To-Glass Joint, H. N. Ridyard. Am. Chem. Soc.—Jl., vol. 46, no. 2, Feb. 1924, pp. 287-290. Method for coating soft glass, hard glass, silica or glazed porcelain, with homogeneous lead films, and for soldering material so coated to metal; can be applied to sheet or tube.

Riveted. See RIVETED JOINTS.

Soft-Soldered. Some Properties of Soft Soldered Joints, T. B. Crow. Chem. & Industry, vol. 43, nos. 12 and 13, Mar. 21 and 28, 1924, pp. 65T-68T and 69T-70T, 15 figs. Points out that tensile strength of joints increases with diminution of thickness of solder film in joint; tensile strength of all joints was less that yield point of copper, but strongest joint had tensile strength of 2½ times that of solder; action of zinc chloride is to prevent oxidation by preventing access of oxygen; it has no electrochemical action.

Welded. See WELDS, Welded Joints.

JUTE

Spinning. Effect of Single Carding of Jute on End Product and Its Economic Aspect (Untersuchungen über den Einfluss des Einkardenspinnverfahrens in der Juteindustrie auf die hergestellten Erzeugnisse und auf die Wirtschaftlichkeit des Betriebssystems), H. Sommer. Brennstoff- und Wärmewirtschaft, vol. 6, no. 4, Apr. 1924, pp. 65-71. Simplification of spinning by using single carding in place of double, without disadvantage to end produce.

K

KAOLIN

Colloidal Plasticity. See CLAY, Colloidal Plasticity.

Dehydration Product. Product of the Dehydration of Kaolin (Le produit de la déshydratation du kaolin), V. Agafonoff and W. Vernadsky. Académie des Sciences—Comptes Rendus, vol. 178, no. 13, Mar. 24, 1924, pp. 1082-1084. Study of product of dehydration of kaolin, obtained by heating at 450—550 deg.; density of product was 2.32—2.38, by flotation method in mixtures of bromoform and ether; product also appeared homogeneous under microscope, possessing similar optical properties to those of kaolin, and was uniformly colored by methylene blue.

Furtei, Sardinia. Kaolin Deposits at Furtei in Sardinia (Il giacimento caolinico di Furtei in Sardegna), E. Repossi. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 1, July 15, 1924, pp. 1-5, and (translation) in Chem. Age (Lond.), vol. 11, no. 275, Sept. 20, 1924, pp. 15-16. Discusses geological formation and gives analysis of some samples.

Georgia. Distribution of Kaolin and Bauxite of the Coastal Plain of Georgia, R. T. Stull. Am. Ceramic Soc.—Jl., vol. 7, no. 7, July 1924, pp. 513-522, 2 figs. Discusses origin of sedimentary kaolins, formation of bauxite, and proposes classification for them.

KAPP VIBRATOR. See ELECTRIC MOTORS, A.C., Kapp Vibrator.

KATALITE. See INTERNAL-COMBUSTION ENGINES, Catalysis Applied to.

KATATHERMOMETERS. See THERMOMETERS, Katathermometers.

KEROGEN. See OIL SHALES, Distillation.

KEROSENE

Distillate, Acid Treatment of. Acid Treatment of Kerosene Distillate, W. M. Fraser. Oil & Gas Jl., vol. 23, no. 2, June 5, 1924, p. 100, 1 fig. Chart accurate to within one point in color, which saves tons of acid and permits keeping kerosene uniform.

Hydrocarbons in. Some Characteristics of the Hydrocarbons in Midcontinent Kerosene, C. R. Wagner. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 135-136. Closed fractionated kerosene cut from Oklahoma crude was separated into two fractions by use of liquid sulphur dioxide; insoluble portion gave evidence of C_nH_{2n} hydrocarbons, but none of paraffin series.

KEYSEATING MACHINES. See DRILLING MACHINES, Slot.

KIESELGUHR. See SILICA, Diatomaceous Earth.

KILNS

Brick. Tunnel Kilns in the Brick Industry (Die Bedeutung des Tunnelofens in der Ziegelindustrie), W. Pohl. Tonindustrie-Zeitung, vol. 48, no. 66, Aug. 16, 1924, pp. 724-727, 4 figs. Discusses experiences with old and new types of tunnel kilns at Saaran, Saxony.

See also Tunnel.

Cement. Efficiency of Cement Kilns With Waste Heat Boilers, H. E. Brown. Cement, Mill & Quarry, vol. 24, no. 2, Jan. 20, 1924, pp. 31-33. How many pounds of coal will be necessary per barrel of clinker and how much power can be generated by hot waste gases at 75 per cent efficiency on boilers, with 15 lb. steam per kw-hr. on turbines, steam to be at 200 lb. pressure on boilers, with superheat 125 deg. fahr. and vacuum of 28 in. on turbines.

New Gas Heated Vertical Cement Kiln (Nouveau four à ciment vertical, chauffé au gaz). Génie Civil, vol. 85, no. 1, July 5, 1924, pp. 14-16, 6 figs. Design and construction of Bartolomeis kiln constructed by Società Forni ed Impianti Industriali di Milano.

Refractories for Rotary Portland Cement Kilns, R. M. Howe. Cement, Mill & Quarry, vol. 24, no. 2, Jan. 20, 1924, pp. 35-38, 1 fig. Factors controlling service secured from fireclay linings and possible advantages to be gained by using linings of another type.

Ceramic. Operation of the Shaw Gas Kiln, L. H. Minton. Ceramist, vol. 4, no. 1, Apr. 1924, pp. 15-28, 8 figs. Design and operation of gas-fired compartment kiln developed in England, especially designed and adapted to firing of the finer grades of ware as well as the cruder types; comparison of fuel consumption; principal advantages.

See also Design; Heat Distribution.

Combustion in. Combustion in Kilns Burning Refractory Ware, R. A. Sherman. Am. Ceramic Soc.—Jl., vol. 7, no. 3, Mar. 1924, pp. 175-188, 2 figs. Results of a study of process of combustion in kilns using coal as fuel, undertaken in connection with investigation of burning problems in manufacture of refractories, conducted by

Bur. Mines in coöperation with Refractories Mfrs. Assn.

Design from Model Tests. The Design of Kilns and Furnaces from Model Tests, F. H. Norton. Am. Ceramic Soc.—Jl., vol. 7, no. 10, Oct. 1924, pp. 783-794, 5 figs. Analyzes effect of scale on gas and heat flow and determines possibilities and limitations of using models.

Drafts. The Significance of Drafts in Down-Draft Coal-Fired Kilns, R. A. Sherman, R. F. Lunger and W. E. Rice. Am. Ceramic Soc.—Jl., vol. 7, no. 4, Apr. 1924, pp. 255-270, 12 figs. Applies fundamental laws of gas flow to movement of gases through down-draft kilns; data on pressure conditions in four kilns presented graphically; cause of draft, superiority of down-draft over up-draft kiln, significance of stack draft, relation of draft and excess air, features of kiln design, and comparative merits of forced, induced, and natural draft. (Pub. by permission U. S. Bur. Mines.)

Heat Distribution. Determination of the Distribution of Heat in Kilns Firing Clay Wares, W. E. Rice and R. A. Sherman. Am. Ceramic Soc.—Jl., vol. 7, no. 10, Oct. 1924, pp. 738-763, 2 figs. Methods of collecting data on performance of ceramic kilns and explanation of formulas used in calculating heat accounts from data.

Lime. See LIME, Kilns.

Rotary. Large Rotary Kiln for Celite Products Company. West. Machy. World, vol. 15, no. 6, June 1924, pp. 187-188, 1 fig. New engineering and mechanical product for California manufacturing plant.

Measure of Air Supply to Rotary Kiln, F. Linstead. Cement, Mill & Quarry, vol. 25, no. 6, Sept. 20, 1924, pp. 35-37, 7 figs. Discusses amount of air required and analysis of gases.

Stokers for. See STOKERS, Automatic Kiln.

Tunnel. Automatic Control of Tunnel Kiln, Phil. Dressler. Fuels & Furnaces, vol. 2, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 33-39, 125-132, and 249-252, 13 figs. Jan.: Porcelain kiln used for baking spark plugs. Feb.: Regulation of gas supply from main and control of temperature in kiln. Mar.: Control of auxiliary gas burners used for producing a reducing atmosphere; anticipated improvements in regulators.

Booth Open Fire Tunnel Kiln. Brick & Clay Rec., vol. 65, no. 10, Nov. 11, 1924, pp. 680-683, 11 figs. Describes operation of two railroad tunnel kilns burning face brick in great variety of shades and textures, by Booth Brick & Lumber Co., New Toronto, Ont.

Burn Brick in Direct Fired Tunnel Kiln. Brick & Clay Rec., vol. 64, no. 8, Apr. 15, 1924, pp. 576-580, 10 figs. Description of Dressler coal-burning open fire tunnel kiln 217 ft. 7½ in. long, designed for production of 15,000 to 20,000 brick per day.

Importance of Tunnel Furnaces in the Brick Industry (Die Bedeutung des Tunnelofens in der Ziegelindustrie). Tonindustrie-Zeitung, vol. 48, no. 31, Apr. 16, 1924, pp. 321-322. Various authorities give their opinions on the subject.

The Direct Fired Car Tunnel Kiln on Roofing Tile, C. R. Minton. Am. Ceramic Soc.—Jl., vol. 7, no. 11, Nov. 1924, pp. 821-823, 2 figs. Describes Harrop car tunnel kiln for firing roofing tile which has been installed at plant No. 1 of Los Angeles Pressed Brick Co. of Los Angeles, Cal. Length, 324 ft. 11½ in.; tunnel width, 4 ft. 10 in.; holds 52 cars each of which carries 2.3 tons of fired ware.

The Role of Tunnel Kilns in the Brick Industry (Die Bedeutung des Tunnelofens in der Ziegelindustrie). Tonindustrie-Zeitung, vol. 48, no. 11, Feb. 6, 1924, pp. 98-101, 3 figs. Discusses advantages and disadvantages.

See also **Brick.**

"Turbine" Forced-Draft Furnace. Scientific Principles in Kiln Operation, A. E. Beet. Fuel, vol. 3, no. 6, June 1924, pp. 217-220, 3 figs. Account of series of tests carried out at firebrick and general refractory works at Charleroi, Belgium, with object of determining results obtained with "Turbine" forced-draft furnace in firing of kilns.

KLYDONOGRAPH. See ELECTRIC MEASURING INSTRUMENTS, Klydonograph.

KNITTING MACHINES

Circular, Manufacture. Building Circular Knitting Machines. Eng. Production, vol. 7, no. 146, Nov. 1924, pp. 327-331, 12 figs. Works and methods of Mellor Bromley & Co., Leicester, England.

KITES

Man-Lifting. Man-Lifting Kites (Neue Richtlinien für den Bau manntragender Drachen und zwei Lösungen des Problems), H. Seehase. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 15, no. 19, Oct. 14, 1924, pp. 201-206, 14 figs. Experiments with such kites were initiated by German Government during war in connection with submarines; aircraft firm, Sablatnig, which coöperated with these experiments, continued them after war; main requirement is that no accident should happen if tow line breaks; last development is kite of parachute type—shallow bags having stiffening frame only around mouth, which can lift loads several times their own weight; it is hoped they find use for sport as well as for military purposes.

L

LABOR

Bibliography. Bibliography. Int. Labour Rev., vol. 9, nos. 4 and 5, Apr. and May 1924, pp. 627-642 and 791-813. International, official, and unofficial publications.

International Publications on Labor. Int. Labour Rev., vol. 9, no. 1, Jan. 1924 pp. 149-160. Bibliography of official and non-official publications.

Publications Relating to Labor. Monthly Labor Rev., vol. 18, nos. 1-6, Jan.-June, 1924, pp. 206-215, 251-257, 214-223, 225-233, 245-254, and 205-212 and vol. 19, nos. 4-6, Oct.-Dec. 1924, pp. 201-210, 268-274, and 187-195. List of official and unofficial publications in United States and foreign countries.

China, Conditions in. Labor Conditions in China, Ta Chen. Monthly Labor Rev., vol. 19, no. 5, Nov. 1924, pp. 36-49. Movement for labor legislation; problems of urban and rural labor; trade unionism; strikes; coöperative movement.

Coal Mines. See INDUSTRIAL RELATIONS, Coal Mines.

Convict. Convict Labor: 1923. Monthly Labor Rev., vol. 18, no. 4, Apr. 1924, pp. 1-33. Abridged report by Bur. of Labor Statistics containing collection of data concerning prison labor production in United States; shows kind and amount

of goods produced by prison labor and systems under which work was done.

Eight-Hour Day. Eight-Hour-Day Application in Continuous Running (Applications simples de la journée de huit heures dans les entreprises à service continu), J. Schwarz. Schweizerische Bauzeitung, vol. 84, no. 10, Sept. 6, 1924, pp. 115-117, 8 figs. Mathematical treatment of on-time and off-time for continuous operations. (In French).

Eight-Hour Shifts. Economies of Eight Hour Shifts in Ironworks (Wirtschaftliche Auswirkung der Achstundenschicht in Hüttenwerken), E. Hofmann. Stahl u. Eisen, vol. 44, no. 37, Sept. 11, 1924, pp. 1101-1105, 1 fig. Discusses decrease of output per capita, reasons for failure of eight-hour shifts, influence of length of shift on frequency of accidents and of sickness.

Family Allowances. Wages and Allowances for Workers' Dependants. Int. Labour Rev., vol. 10, no. 3, Sept. 1924, pp. 470-485. Discusses system of paying family allowances to workers over and above their ordinary wages; reasons for introduction of such systems and extent to which they are in operation.

Firemen. Qualitative Remuneration of Firemen (Ein Weg zur qualitativen Bezahlung der Heizerarbeit), K. Münzer. Wärme, vol. 47, no. 35, Aug. 29, 1924, pp. 406-409, 6 figs. Work of firemen and losses in combustion; determining quality of firemen's work; bonus by means of Duplex-Mono slide rule.

48-Hour Week. The Forty-Eight Hour Week and Industrial Efficiency, P. S. Florence. Int. Labour Rev., vol. 10, no. 5, Nov. 1924, pp. 729-758. Results of scientific study of effects of changes in hours of work or of introducing rest pauses into working hours, and of variations in output during working day, all tend, in writer's opinion, to general conclusion that on the whole the 48-hr. week is probably optimum length of hours, giving for majority of industrial operations maximum output with minimum accidents, lost time, and overhead charges, and permitting efficient distribution of working hours throughout week and day.

Hours of Work. Effect of Changes in Hours of Work on Output. Monthly Labor Rev., vol. 19, no. 1, July 1924, pp. 120-124. Discusses 8-hr. day entirely from economic standpoint and analyzes existing data on relation between hours of work and production, showing complexity of problem.

Hours of Work and Output, O. Lipmann. Int. Labour Rev., vol. 9, no. 4, Apr. 1924, pp. 481-506. Economic aspect of 8-hour day; author surveys existing data on relation between hours of work and output and finds few of them scientifically satisfactory; analyzing various factors determining hourly output, he shows extreme complexity of problem and danger of attributing changes in output solely to changes in hours; he believes that solution of problem of increasing output is to be found rather in increased intensity of work than in change in working hours. Bibliography.

Legal Restrictions on Hours of Work in the United States. Nat. Indus. Conference Board—Research Report no. 68, 1924, 125 pp. Systematic analysis of existing legislation restricting hours of work in United States.

The Question of Hours of Work of Furnace Hands (Zur Frage der Arbeitszeit für die Feuerarbeiter der Hüttenwerke), M. Schellewald. Stahl u. Eisen, vol. 44, no. 46, Nov. 13, 1924, pp. 1446-1455, 10 figs. Three-shift system; conflicting views and difficulties on hours of work; demands of workers; detail figures of working hours; etc.

Immigration and. See IMMIGRATION.

International Conference. The Sixth Session of the International Labour Conference. Int. Labour Rev., vol. 10, no. 4, Oct. 1924, pp. 550-582. Four main items on agenda were: Development of facilities for utilization of workers' leisure; equality of treatment for national and foreign workers as regards workmen's compensation for accidents; weekly suspension of work for 24 hours in glass-manufacturing processes where tank furnaces are used; night work in bakeries; includes appendix giving recommendation adopted by Conference.

International Organization. The Legal Character of the International Labour Organisation, J. de Vilallonga. Int. Labour Rev., vol. 9, no. 2, Feb. 1924, pp. 196-207. Discusses work of M. Guerreau, entitled International Labour Organization, especially that part dealing with legal status of the organization and nature of functions assigned to it by Treaty of Versailles and corresponding parts of other peace treaties.

Legislation, Bibliography. Bibliography of Recent Labour Legislation. Int. Labour Rev., vol. 9, nos. 2 nd 3, Feb. and Mar. 1924, pp. 289-316 and 427-466. List of laws and orders and international conventions comprising all those, text of which was received by Int. Labor Office subsequently to list published in Nov. and Dec. 1923, numbers of Review.

Bibliography of Recent Labour Legislation and Official and Non-Official Publications. Int. Labour Rev., vol. 10, nos. 3, 4, 5 and 6, Sept., Oct., Nov. and Dec. 1924, pp. 509-545, 703-727, 878-908, and 1062-1089.

Legislation, Bulgaria. Labour Legislation in Bulgaria, I. Yanouloff. Int. Labour Rev., vol. 10, no. 3, Sept. 1924, pp. 435-451. Protection of women and children; hours of work; hygiene and safety; factory inspection; social insurance.

Legislation, Mexico. Labor Law of Jalisco, Mexico, E. Y. Larson. Monthly Labor Rev., vol. 18, no. 6, June 1924, pp. 21-36. Law covers labor contracts, rights and obligations of contracting parties, hours and wages, conciliation and arbitration, employers' organizations and trade-unions, strikes and lockouts, private employees, shop rules, apprentices, safety and hygiene regulations, workmen's compensation and labor inspection.

Organizations, Roumania. Labor Organisations in Roumania, N. Ghiulea. Int. Labour Rev., vol. 9, no. 1, Jan. 1924, pp. 31-49. Organization of craftsmen; trade unions.

Pensions, Old-Age. See PENSIONS.

Railway, Germany. Labor Problem of the German State Railroads. Monthly Labor Rev., vol. 19, no. 1, July 1924, pp. 47-54. Discusses reasons for change from large surplus to huge deficit of railways, including increase in payroll and cost of materials, deteriorated railway conditions, diminished labor efficiency, faulty employment policy, etc. Abstract taken from Jl. Political Economy.

State Control, New Zealand. Experiments in State Control in New Zealand, J. B. Condliffe. Int. Labour Rev., vol. 9, no. 3, Mar. 1924, pp. 334-360. Traces developments of Arbitration Court and Board of Trade and recounts development of system of compulsory arbitration in labor disputes, dealing particularly with growing opposition to Arbitration Court manifested by certain leading trade unions in recent years.

Strikes. See STRIKES.

Trade Unions. See TRADE UNIONS.

Two and Three Shifts. The Working Shift in German Iron and Steel Works. Iron & Coal Trades Rev., vol. 109, no. 2952, Sept. 26, 1924, p. 516. Discusses question of favorable influence on production due to recent introduction of two-

shift system (in lieu of previous three-shift system) in German iron and steel works.

Unemployment. See UNEMPLOYMENT.

Utilization of Leisure. The Utilisation of Leisure in Finland. Int. Labour Rev., vol. 9, no. 4, Apr. 1924, pp. 573-586. Article based on information communicated by N. A. Mannio, Director of Gen. Dept. of Finnish Ministry of Social Affairs.

Wages and Hours. Wages and Hours of Labor. Monthly Labor Rev., vol. 19, no. 1, July 1924, pp. 101-119. Wages and hours in blast-furnace, Bessemer, open-hearth, and tin departments of iron and steel industry, 1924.

Wages and Hours of Labor. Monthly Labor Rev., vol. 19, no. 2, Aug. 1924, pp. 91-123. Details for iron workers in U. S., glass workers in Belgium, metal workers in Finland, mines and metal workers in France.

Wages and Hours of Labor in the Automobile Tire Industry, 1923. U. S. Bur. Labor Statistics—Bul., no. 358, Apr. 1924, pp. 1-58. Report shows results of study of wages and hours of labor in automobile tire industry in 1923. Information compiled covers 22,535 male wage earners and 1624 female wage earners working in 49 representative establishments located in Connecticut, Indiana, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, and Wisconsin. Tables show earning as per hour, full time or customary hours per week, hours and days actually worked, and earnings actually received in representative pay period taken.

Wages and Hours of Labor in Lumber Manufacturing in the United States, 1923. U. S. Bur. Labor Statistics—Bul., no. 363, Aug. 1924, 32 pp. Gives earnings per hour and per week and hours of labor per week. Sawmill operation only is covered. Tables.

See also WAGES.

Welfare Work. See WELFARE WORK.

Workmen's Compensation. See WORKMEN'S COMPENSATION.

LABOR TURNOVER

"Absentism." Absentism Factors for Industrial Plants, J. D. Hackett. Mgmt. & Administration, vol. 7, no. 2, Feb. 1924, pp. 199-203. Relative importance of absence; nature, calculation, and extent of absence; absence and wages; prevention of absence; remedies.

Reducing. Reducing the Turnover of Labor, C. A. Walker. Iron Trade Rev., vol. 74, no. 5, Jan. 31, 1924, pp. 350-352, 4 figs. Suitable records afford basis for study of causes of labor turnover.

What 86 Years Have Taught Us About Selecting Labor, H. B. Cheney. Monthly Labor Rev., vol. 18, no. 5, May 1924, pp. 1-13, 5 figs. Factors affecting labor cost: how to fit applicant to right job; keeping labor turnover down to minimum; how "credit rating" plan aids in reducing turnover.

LABORATORIES

Automobile Research. Cross-Examining the Automobile, A. C. Lescarboura. Sci. Am., vol. 131, no. 1, July 1924, pp. 8-9, 59-60, and 62, 4 figs. What organized research work is doing for present and future automotive industry; General Motors research laboratory at Dayton, Ohio.

Bell-System Research. The Bell System Research Laboratories, E. B. Craft. Elec. Communication, vol. 2, no. 3, Jan. 1924, pp. 152-163, 15 figs. Details of laboratories located in New York City, and outstanding achievements of past ten years.

Cable Research. Research Laboratories at a Cable Works. Engineer, vol. 138, no. 3596, Nov. 28, 1924, pp. 607-608, 9 figs. partly on p. 614. Layout and equipment of laboratory of Henley's Telegraph Works Co., Gravesend, Kent, Eng.

Chemical. See ELECTRIC RAILWAYS, Chemistry in Service of.

Electric-Insulator Testing. Ampere Laboratory (for Million-Volt Tests) of the Cie Electroceramique [Le Laboratorie Ampère (pour essais électriques à 1 million de volts) de la Compagnie générale d'Electro-céramique]. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 123, no. 7, July-Sept. 1924, pp. 619-626, 6 figs. Describes layout, buildings and equipment, including converters, transformers for stepping-up voltage, control desk, etc.; porcelain insulators testing methods.

The Ampere Laboratory for Very High-Tension Tests (Le Laboratoire Ampère, de la Compagnie générale d'Electro-Céramique, pour essais à très hautes tensions). Génie Civil, vol. 84, no. 8, Feb. 23, 1924, pp. 183-185, 8 figs. Describes laboratory recently erected at Ivry-Port by Compagnie générale d'Electro-Céramique, in which voltage of one million volts has been obtained, and which is intended principally for testing porcelain insulators manufactured by company.

The New Ampere Laboratory (Le nouveau laboratoire "Ampère"), P. Normier. Industrie Electrique, vol. 33, no. 767, June 10, 1924, pp. 205-209, 7 figs. Describes new laboratory of Cie. Générale d'Electrocéramique including buildings, current supply, converter groups, stepping-up transformers (up to 1,000,000 volt), etc., for testing high-tension material and especially porcelain insulators.

Electrical, Germany. New Equipment of Institute for Low-Tension Technics at the Dresden Technical High School (Die Neueinrichtungen des Instituts für Schwachstromtechnik der Technischen Hochschule Dresden), H. Barkhausen. Elektrotechnische Zeit., vol. 45, no. 49, Dec. 4, 1924, pp. 1338-1341, 10 figs.

Illumination. The Lighting Laboratories of the Baden Technical High School at Karlsruhe (Das Lichttechnische Institut der Badischen Technischen Hochschule in Karlsruhe), J. Teichmüller. Zeit. für Technische Physik, vol. 5, no. 8, 1924, pp. 321-327, 12 figs. Details of construction, light and dark rooms, equipment for testing lamps, research work and lecture courses.

Germany. See Electrical; Illumination.

High-Voltage. California Institute of Technology's Million-Volt Laboratory, R. W. Sorensen. Jl. Electricity, vol. 53, no. 7, Oct. 1, 1924, pp. 242-244, 7 figs. See also Elec. Wld., vol. 84, no. 14, Oct. 4, 1924, pp. 735-737, 4 figs. Details of equipment; electrical connections; voltage measurement; building characteristics.

Laboratories for Testing at Very High Voltages (Les installations d'essais à très haute tension), M. Gillon. Société Française des Electriciens—Bul., vol. 4, no. 31, Jan. 1924, pp. 5-42, 29 figs. Brief discussion of characteristics of special laboratories for testing cables, and review of phenomena observed in tests at very high voltage; examination of devices adopted to test transformers, arrangement of apparatus in testing room, resistances, alternator, measuring instruments, voltmeters, potentiometers, devices for measuring current and energy, etc.; details of laboratory of University of Louvain.

Hydraulic. The Hydraulic Laboratory of the Instituto Católico de Artes é Industrias (Spain) (Laboratorio hidráulico del I. C. A. I.), J. M. F. deCastro. Anales de la Asociacion de Ingenieros del Instituto Católico de Artes é Industrias, vol. 3, no. 4, 1924, pp. 350-358, 9 figs. Details of mechanical and electrical equipment, and activities of laboratory.

Materials, Testing. Observations on the Operation of Material Testing Laboratories, F. H. Jackson. Pub. Roads, vol. 5, no. 4, June 1924, pp. 14-17. 55 laboratories were inspected to ascertain to what extent they were following approved methods of testing as recommended by Committee on Tests & Investigations of Am. Assn. State Highway Officials and approved by Bur. Pub. Roads.

Testing Materials in the Laboratory. Machy (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 184-186, 7 figs. How metallurgical laboratory maintained by Bullard Machine Tool Co. controls quality of materials used in building machines in shop.

Metallurgical. The Ernesto Breda Scientific and Technical Institute (L'Istituto Scientifico Tecnico "Ernesto Breda"), G. Bozza. Giornale di Chimica Industriale ed Applicata, **vol. 6, no. 8,** Aug. 1924, pp. 383-386, 10 figs. Details of equipment and activities of testing laboratory for metallurgy founded in 1917.

Mining and Metallurgical. The Southern Experiment Station—Its Problem and Purpose, A. H. Hubbell. Eng. & Min. Jl.—Press, vol. 118, no. 4, July 26, 1924, pp. 132-134, 8 figs. U. S. Bur. Mines established mining and metallurgical experiment station at Tuscaloosa, Ala., for purpose of studying ways of beneficiating low-grade iron ores. Anticipates future needs by studying possibilities of washing low-grade iron ores.

National Physical Laboratory, England. The National Physical Laboratory. Engineering, vol. 117, no. 3052, and vol. 118, nos. 3053 and 3055, June 27, July 4, and 18, 1924, pp. 823-824, 5-6, and 100-101, 1 fig. Review of work done by the Laboratory during 1923, including work of engineering and aerodynamics departments, work on metallurgy, physics, electrical standards and measurements, wireless, electrotechnics, cables, and photometry.

See also RESEARCH, National Physical Laboratory.

Petroleum Refinery. Laboratory Control Work Is Explained, W. E. Espy. Oil & Gas Jl., vol. 23, no. 6, Jan. 10, 1924, pp. 76, 84, and 86. Deals with control work of physical-testing laboratory of Cosden & Co.; testing methods; distillation test and apparatus; flash and fire tests; cloud and pour test; viscosity test.

Research, Raw Materials Testing. Testing Raw Materials in a Research Laboratory. Min. & Oil Bul., vol. 10, no. 7, July 1924, pp. 709-715, 6 figs. Notes on equipment and methods for testing materials used in oil-well equipment, at research laboratory of Axelson Machine Co., recently completed in connection with their Los Angeles plant.

Siemen-Schuckert. Testing and Research Laboratories of the SSW. Dynamo Works [Das Prüf- und Versuchsfeld (P. V. F.) des Dynamowerks der SSW.], G. Bopp and G. Köhler. Siemens-Zeit., vol. 4, nos. 7 and 8, July and Aug. 1924, pp. 202-207 and 263-268, 15 figs. Describes new laboratories installed at Siemensstadt; general layout of works and laboratories, equipment and tests carried out; current distributing lines and switching arrangements.

Telephone-Research. Engineering Research in the Post Office, B. S. Cohen. Telegraph & Telephone Jl., vol. 11, no. 117, Dec. 1924, pp. 46-49, 7 figs. Layout of new Engineering Research Station at Dollis Hill, England, description of laboratories, and outline of organization.

LACQUERS

Automobile Body Finish. See AUTOMOBILES, Bodies, Finishing.

Nitrocellulose and Pyroxylin. See NITROCELLULOSE, Lacquers.

LADLES

Bottom-Pour. Maintaining Down Pour Ladles, S. R. Robinson. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 316-317, and Iron Trade Rev., vol. 74, no. 24, June 12, 1924, pp. 1568-1569. Principal causes of trouble in operation of steel ladles; suggests remedies which should help to remove prejudice against pouring devices of this type.

Portable Drying Apparatus. Portable Ladle Drying Apparatus, H. Hermanns. Foundry, vol. 52, no. 5, Mar. 1, 1924, p. 197, 1 fig. Describes arrangement employed in German steel foundry; flexible couplings render drying apparatus movable within upright ladle; direct control provided.

LANTERN SLIDES

Projectors. The Projection Apparatus as an Aid in Technical Addresses (Der Bildwerfer als Hilfsmittel für technische Vorträge), P. v. Denffer. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 17, Apr. 26, 1924, pp. 413-415, 6 figs. Points out defects of usual lantern-slide projectors and describes design which eliminates these defects.

Technical, Design. Modern Design of Technical Lantern Slides, P. Wölfel. Eng. Progress, vol. 5, no. 10, Oct. 1924, pp. 223-225, 7 figs. Rules governing their design, worked out by German Industrial Standards Committee; discusses two kinds of technical lantern slides, those made from drawings, and those representing photographed objects.

Technical, Standardization. Standardization of Technical Lantern Slides (Normung des technischen Lichtbildes), P. Wölfel. Siemens-Zeit., vol. 4, no. 3, Mar. 1924, pp. 79-82, 7 figs. Standardization committee has been formed in Germany to determine best features of lantern-slide making and of supervising and collecting technical slides and making them generally accessible at headquarters to be established; gives rules adopted.

LATH

Metal. See BUILDING CONSTRUCTION, Metal Lath for Fire Protection; Metal-Lath Reinforcement.

LATHES

Bench. Vidal Precision Bench Lathe. Machy. (Lond.), vol. 24, no. 626, Sept. 25, 1924, pp. 841-843, 6 figs. Describes lathe made by Vidal Eng. Co., Croydon, England; is of 3½-in. centers, bed being 33 in. in length; bed is of flat type with sloping edges.

Work of the Bench Lathe, F. D. Jones. Machy. (N. Y.), vol. 30, no. 12, and vol. 31, no. 1, Aug. and Sept. 1924, pp. 960-964 and 26-31, 24 figs. Examples from practice, illustrating methods of using various tools and attachments for precision toolmaking and manufacturing operations, including grinding, lapping, thread cutting, milling, cutter relieving, and screw slotting.

Capstan. See Turret.

Centers, Production of. Producing Lathe Centres in Quantities. Eng. Production, vol. 7, no. 147, Dec. 1924, p. 353, 2 figs. Describes five main operations.

Chucking Operations. The Machining of Small Components. Machy. (Lond.), vol. 23, no. 599, Mar. 20, 1924, pp. 793-803, 27 figs. Chucking operations on small automatic and capstan machines.

Comparative Measurements on. Comparative Measurements on Lathes (Vergleichsmessungen an Drehbänken), K. Meller. Siemens-Zeit., vol. 4, nos. 4-5 and 6, Apr.-May and June 1924, pp. 116-121 and 177-181, 10 figs. Results of measure-

ments made by Siemens-Schuckert Works on two lathes showing influence of system of drive on efficiency and performance of a lathe. Single drive and group drive, and comparative cost.

Cone-Pulley Drive. The Modern Lathe, P. G. Tetzner. Eng. Progress, vol. 5, no. 11, Nov. 1924, pp. 237-241, 20 figs. Constructive details of high-speed lathe wtih cone-pulley drive, manufactured by Wotan Werke, Leipzig.

Developments. Notes on Lathe Developments, F. Horner. English Mechanics, vol. 119, nos. 3083, 3084, and 3085, Apr. 25, May 2, and 9, 1924, pp. 196-197, 215-216, and 231, 4 figs. Brief résumé of progress in lathe construction.

Duomatic Automatic. Duomatic Lathe Performs Two Operations at the Same Time. Automotive Industries, vol. 50, no. 22, May 29, 1924, pp. 1186-1187, 6 figs. Full automatic machine, made by Lodge & Shipley Machine Co., Cincinnati, has two complete carriages with two slides, each with its power feed and independent quick forward-and-return traverse.

Elliptic-Turning Attachment. Lathe Attachment for Elliptic Turning, I. F. Yeoman. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 677-678, 5 figs. Describes attachment primarily employed for elliptical-turning operations on punches and dies used in making oval or elliptical frames for retaining glass windows in automobile tops.

Engine. Unusual Engine Lathe Operations. Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 207-211, 12 figs. Contains following articles: Arc Grinding in the Lathe, R. A. Black; Boring Concentric Slots, Phil. F. Shafran; Internal Spherical Turning, M. W. Kotawba; Deep-Hole Drilling Job, G. W. Jager; Winding a 300-Foot Coil Spring, J. J. Appel.

Gap. The Buckman 8½-inch Centre Lathe. Machy. (Lond.), vol. 23, no. 590, Jan. 17, 1924, pp. 511-512, 3 figs. Distinguishing feature of hollow-spindle, gap-bed lathe is novel construction of bed.

Gear-Box Design. Production Design of a Lathe Feed Gear-box, A. Clegg. Machy. (Lond.), vol. 23, no. 597, Mar. 6, 1924, pp. 735-737, 3 figs. Gives example of expensive design of 3-speed lathe feed-gear box and shows how this can be substituted by cheaper and better design of similar gear box.

High-Speed. Modern High-Speed Lathes. Eng. Progress, vol. 5, no. 5, May 1924, pp. 81-84, 9 figs. Design of headstock, feed gear, etc., of high-speed lathe manufactured by Heidenreich & Harbeck, Hamburg; comparison of economy with ordinary lathes.

Hollow-Spindle. New Hollow Spindle Lathe for Crankshafts Reduces Overhang to a Minimum. Automotive Industries, vol. 51, no. 18, Oct. 30, 1924, pp. 774-775, 2 figs. Ruggedness of construction siad to permit extra heavy cuts to be taken simultaneously with both front and rear tools; enlarged hollow spindle permits telescoping work inside headstock.

Inspection. Checking Lathes for Accuracy. Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 195-199, 12 figs. Methods employed at plant of Am. Tool Works Co., Cincinnati, in inspecting various parts of lathes and assembled machines.

The Inspection System in a Lathe Building Plant, H. S. Riggs. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 835-841, 12 figs., and Machy. (Lond.), vol. 24, no. 616, July 17, 1924, pp. 481-486, 12 figs. Checking accuracy of lathe parts, assembled units and completed machines of Lodge & Shipley Machine Tool Co.

Interchangeable Construction. Building Lathes Interchangeably, Chas. O. Herb. Machy. (N. Y.), vol. 30, no. 10, June 1924, pp. 758-761, 8 figs. See also Machy. (Lond.), vol. 24, no. 613, June 26, 1924, pp. 389-392, 8 figs. Manufacturing methods used by Chard Lathe Co., New Castle, Ind., to facilitate assembly of machines and supply of replacement parts.

Magazine Attachments. Design of Magazine Attachments, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 847-850, 8 figs. Magazine attachments for irregular work.

Screw-Cutting. Production of a 4-inch Screw-cutting Lathe. Machy. (Lond.), vol. 24, no. 601, Apr. 3, 1924, pp. 11-14, 9 figs. Practice of Britannia Lathe & Oil Engine Co., Colchester.

Small Screw-cutting Lathes. Machy. (Lond.), vols. 24 and 25, nos. 622 and 629, Aug. 28, and Oct. 16, 1924, pp. 688-692 and 78-84, 37 figs. Recent points in design.

Semi-Automatic. Semi-Automatic Lathe of Interesting Design, C. C. Walker. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 870-873, 6 figs. See also Machy. (Lond.), vol. 24, no. 620, Aug. 14, 1924, pp. 623-626, 6 figs. Construction of machine; character of work; special form cutter used.

Surfacing and Boring. The Surfacing and Boring Lathe—The Poor Man's Turret Lathe, A. Clegg. Brit. Machine Tool Eng., vol. 3, no. 26, Mar.-Apr. 1924, pp. 33-42, 10 figs. Discusses merits and possibilities of surfacing and boring lathes.

Tool Equipment for. High Production Tool Equipment for Capstan and Turret Lathes, E. W. Field. Brit. Machine Tool Eng., vol. 3, no. 30, Nov.-Dec. 1924, pp. 172-182, 20 figs. Describes tool equipment exhibited by H. W. Ward & Co. at Machine Tool Exhibition at Olympia.

Turret. Capstan and Turret Lathe Practice, E. W. Field. Machy. (Lond.), vols. 24 and 25, nos. 612, 613, 614, 616, 618, 619, 624, 628, 630, 631 and 635, June 19, 26, July 3, 17, 31, Aug. 7, Sept. 11, Oct. 9, 23, 30, and Nov. 27, 1924, pp. 369-372, 401-405, 433-435, 489-492, 553-557, 585-591, 743-747, 33-39, 116-120, 129-134, and 257-262, 161 figs. Methods of tooling and chucking.

Chucking Work on Turret Lathes (Wirtschaftliche Ausführung von Futterarbeiten auf Revolverdrehbänken), A. Figge. Maschinenbau, vol. 3, no. 12, Mar. 27, 1924, pp. 396-397, 5 figs. Advantages of multiple-hole turret lathe with horizontal revolving head in regard to simplicity and convenient adjustment of tools.

Machining Differential Housings on a Universal Turret Lathe, I. F. Yeoman. Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 217-219, 6 figs. Describes special equipment.

Machining Piston-valve Follower on the Turret Lathe. Machy. (Lond.), vol. 23, no 595, Feb. 21, 1924, pp. 690-691, 2 figs. Operations and tooling equipment employed in machining piston-valve followers on Libby turret lathe.

New Turret Lathe Has Greater Power and Range of Feed. Automotive Industries, vol. 51, no. 15, Oct. 9, 1924, pp. 652-653, 4 figs. No. 1—A universal hollow hexagon turret lathe of Warner & Swasey Co. is featured by all-steel geared head, increased number and range of feeds and feed control in carriage aprons.

Normal Capacity of Turret Lathe Increased, L. S. Love. Iron Age, vol. 114, no. 24, Dec. 11, 1924, pp. 1529-1531, 7 figs. Offset chuck jaws effect nearly double production; combining operations improves quality of product.

The Ungeared Capstan Lathe as a Chucking Machine, E. W. Field. British Machine Tool Eng., vol. 3, nos. 25 and 27, Jan.-Feb. and May-June 1924, pp. 3-7 and 28, and 54-60, 19 figs. No. 25: Examples showing large range of chucking work

small plain-head turret lathe will cover. Includes layout for cone-driven friction geared lathe of 6½-in. centers built by H. W. Ward & Co., and examples on ungeared range by same maker. Describes various processes.

Turret vs. Lathe Work. Lathe and Turret Work Compared, J. Horner. Mach. World, vol. 75, nos. 1932 and 1937, Jan. 11 and Feb. 15, 1924, pp. 18-19 and 94, 10 figs. Describes procedure.

Unusual Operations with. Unusual Engine Lathe Operations. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 859-863, 12 figs. Contains following prize-winning articles in contest on interesting lathe practice: Worm Grinding in the Lathe, Jas. W. Armour; Precision Form-Turning, O. S. Marshall; Positioning Details on Drawings, E. Heller.

LAUNDRIES

Power Plants. See STEAM POWER PLANTS, Laundry.

LAUNDRY MACHINERY

Ironing Machines. An Improved Decoudon Ironing Machine. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 565-566, 2 figs. New type of machine is capable of drying and finishing all ordinary flat work with one passage through 42-in. roller.

LAUTAL. See ALUMINUM ALLOYS, Lautal.

LEAD

Alloys. See LEAD ALLOYS.

Antimony Removal. Investigation of the Removal of Antimony from Technical Lead by the Dry Method (Untersuchung über die Entfernung des Antimons aus dem Werkblei auf trockenem Wege), H. Leroux. Metall u. Erz, vol. 21, no. 18, Sept. 1924, pp. 421-432, 11 figs. Purpose and development of dry refining of lead; studies effect of reduction of antimony metal on oxide of lead; results of experiments and their influence on lead-refining process.

Corrosion. See CORROSION, Lead.

Electrolysis. Dissolution of Lead in Alkaline Lye by Means of Sinusoidal Alternating Current (Ueber die Auflösung des Bleies in den alkalischen Laugen mittels Sinuswechselstrom), F. Jirsa and J. Fabinger. Zeit. für Physikalische Chemie, vol. 109, no. 3-4, May 5, 1924, pp. 260-274; 10 figs. Results of experiments show that lead is dissolved by alternating current as bivalent, effect of number of periods on quantity dissolved, etc.

Pig, Molding and Loading. The Newman System of Molding and Loading Pig Lead, Wm. E. Newman. Min. & Metallurgy, vol. 5, no. 210, June 1924, pp. 267-269, 5 figs. Notes on size and shape of lead pigs and customary manner of stacking them in cars; description of lead-molding wheel.

Products, Manufacture. The Manufacture of Lead Products. Metal Industry (N. Y.), vol. 22, no. 4, Apr. 1924, pp. 139-142, 5 figs. Notes on manufacture of white lead, litharge, orange lead, and red lead at works of Cookson & Co., Newcastle-on-Tyne, Eng.

Statistics. The Mineral Industry of the British Empire and Foreign Countries. Lead. Imperial Mineral Resources Bureau, Lond., 1924, 67 pp. Statistics for 1920-1922 on production, exports and imports, and prices.

Structure. Crystalline Structure of Lead and Thallium (Struttura cristallina del piombo e del tallio), G. R. Levi. Nuovo Cimento, vol. 1, no. 2 (new series), May-June 1924, pp. 137-144. Details of experiments to establish datas for crystals.

LEAD ALLOYS

Alkaline-Earth Metals and. Equilibrium between Sodium and Potassium and Their Chlorides in the Fused State, and the Production of Alloys of Alkaline-Earth Metals and Lead (Ueber Gleichgewichte zwischen Natrium und Kalium und ihren Chloriden im schmelzflüssigen Zustand sowie über Herstellung von Erdalkalibleilegierungen), K. Jellinek and G. Tomoff. Zeit. für Physikalische Chemie, vol. 111, no. 3-4, Aug. 5, 1924, pp. 234-250, 4 figs. Equilibrium of reaction between alkali metals and their molten chlorides was studied by introduction of lead phase; alloys of lead with alkaline-earth metals are prepared by fusing together mixture of 75-85 per cent of alkaline-earth chloride and sodium-lead alloy containing about 10 per cent.

Casting. See CASTING, Lead Alloys.

Dross. Determination of Lead, Copper, and Tin in Drosses, J. H. Hastings Eng. & Min. Jl.—Press, vol. 118, no. 8, Aug. 23, 1924, pp. 293-294. Describes methods of analyzing drosses for lead, copper, and tin.

Lead-Antimony. Grain Growth in Lead Containing One Per Cent. of Antimony, R. S. Dean and W. E. Hudson. Am. Chem. Soc.—Jl., vol. 46, no. 8, Aug. 1924, pp. 1778-1786, 5 figs. Discussion of mechanism of grain growth as indicated by results of investigation of relations of time, temperature and amount of deformation to grain size.

Production of Thief-Proof Lead Seals (Versuche zur Herstellung diebessicherer Bleiplomben), M. Kühnel and M. Marzahn. Zeit. für Metallkunde, vol. 16, no. 7, July 1924, pp. 278-279, 3 figs. Proposes replacing lead by lead-antimony alloy as more suitable and gives examples of application.

White Metals. Analysis of White Metals (Analisi dei metalli bianchi), A. Trucco. Metallurgia Italiana, vol. 16, no. 9, Sept. 1924, pp. 378-388, 3 figs. Metals with high and medium lead content, and with antimony and tin base, and methods for determining constituents.

LEAD DEPOSITS

Australia. See SILVER DEPOSITS, Australia.

Canada. See SILVER DEPOSITS, Canada.

Great Britain. Lead- and Zinc-Ores in the Slaty Rocks of Britain, O. T. Jones. Instn. Min. Engrs.—Trans., vol. 64, Pt. 5, Feb. 1924, pp. 219-242, 2 figs. Review of distribution and mode of occurrence.

Mississippi Valley. Upper Mississippi Lead and Zinc Ores, J. E. Spurr. Eng. & Min. Jl.—Press, vol. 117, nos. 6 and 7, Feb. 9 and 16, 1924, pp. 246-250 and 287-292, 16 figs. Discusses conditions under which ores occur, and mentions some of the mose widely accepted interpretations of origin.

Transvaal. See SILVER DEPOSITS, Transvaal.

LEAD METALLURGY

Ore Dressing. See COPPER METALLURGY, Ore Dressing.

Roasting. Investigations on Lead Roasting at the Sulphide Corporation's Works at Cockle Creek, N. S. W., G. L. Clark. Australasian Inst. Min. & Metallurgy—Proc., no. 54, June 30, 1924, pp. 27-54, 17 figs. Lead-roasting in the Godfrey furnaces and Huntingdon-Heberlein pots; account of experiments on utilization of hood gases from Huntingdon-Heberlein pots for acid making.

Smelting. Lead Smelter Snapshots, E. H. Robie. Eng. & Min. Jl.—Press, vol. 117, no. 18, May 3, 1924, pp. 716-721, 20 figs. Notes on practice at plants of St. Joseph Lead Co., Her-

culaneum, Mo.; Federal Lead Co., Federal, near East Alton, Ill.; and St. Louis Smelting & Refining Wks., Collinsville, Ill.; in which three plants all of the Missouri concentrates are treated.

Lead Smelting at Sulphide Corporation Ltd.'s Cockle Creek Works, H. A. Evans. Australasian Inst. & Metallurgy—Proc., no. 51, Sept. 30, 1923, pp. 31-45, 3 figs. Some of the practices and conditions peculiar to these works, and some experiments carried out and conclusions reached.

LEAD MINES

Australia. The Lead Mines at Galena, Northampton, W. A., C. M. Harris. Chem. Eng., & Min. Rev., vol. 16, no. 192, Sept. 5, 1924, pp. 475-477. Review of developments.

Canada. A Short History of the Discovery and Development of the Sullivan Mine; the Solution of Its Difficult Metallurgical Problems; and a Description of the Plants Used in the Reduction of Its Ores, W. M. Archibald, E. G. Montgomery, E. M. Stiles, R. W. Diamond, B. A. Stimmel, J. Buchanan, G. E. Murray, J. J. Fingland and S. G. Blaylock. Instn. Min. & Metallurgy—Bul., no. 241, Oct. 1924, 55 pp., 16 figs., partly on supp. plates.

Ontario's Lead Mine, M. E. Wilson. Can. Min. Jl., vol. 45, nos. 20 and 21, May 16 and 23, 1924, pp. 477-478 and 501-502. Description of Kingdon mine, Galetta, Ontario.

The Development of the Sullivan Mine and Processes for the Treatment of its Ores. Can. Inst. Min. & Met., no. 146, June 1924, pp. 401-465, 23 figs., partly on supp. plates. Outline of history of Sullivan mine, now owned and operated by Consolidated Min. & Smelting Co. of Can., Ltd.; the various methods by which ore has been treated in efforts to solve metallurgical problems which its complex character presents; outline of present mining and metallurgical practice and description of mining and milling plant at Kimberley and smelter and refineries at Trail, in British Columbia.

Italy. Primary and Secondary Ores of the Bottino Mines, Italy. C. L. Sagui. Economic Geology, vol. 19, no. 6, Sept.-Oct. 1924, pp. 542-549. Mineralogy of veins; primary ores; origin of secondary ores.

Mexico. The Ahumada Lead Mine and the Ore Deposits of the Los Lamentos Range, in Mexico, T. A. Rickard. Eng. & Min. Jl.-Press, vol. 118, no. 10, Sept. 6, 1924, pp. 365-373, 9 figs. History of development of mine; geology of district; interesting possibilities of ground yet unopened; production of the two companies, Erupcion Min. Co. and Ahumada Lead Co., in May and June.

LEAD ORE

Classification. See ORE DRESSING, Classification.

Prospecting. How and Where to Prospect for Lead Mines; Some Pertinent Pointers for the Field Man, S. F. Hunt. Salt Lake Min. Rev., vol. 25, no. 19, Jan. 15, 1924, pp. 25-26. Geologic relations; ore-making menstruums never reach surface; surface indications, and mineral belts.

LEATHER

Artificial. Artificial Leather (Kunstleder), K. Micksch. Kunststoffe, vol. 14, no. 8, Aug. 1924, pp. 120-122. Discusses multifarious uses of artificial leather, process of manufacture, dyeing, materials used, etc.

Automobile Upholstery. Automobile Upholstery Leather, K. L. Herrmann and F. J. Radel. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 327-334, 19 figs. Authors explain technical terms used in leather manufacture and describe process by which hide is transformed into upholstery leather suited for automobile use; defects and their influence on finished product; hide is followed through different stages of its transformance into leather from its green salted state.

Belting. See BELTING, Leather.

Manufacture. Applied Research Pays Dividends in Leather Manufacture, A. G. Wikoff. Chem. & Met. Eng., vol. 30, no. 23, June 9, 1924, pp. 896-901, 11 figs. Production of Russia calf, a vegetable-tanned calf leather used for uppers of high-grade shoes; raw skins are refrigerated; hair loosened by lime; lubricating leather fibers.

Puering and Bating. Some Scientific Aspects of Puering and Bating, C. E. Pickard. Chem. & Industry, vol. 43, no. 19, May 9, 1924, pp. 476-480, 3 figs. Attempt to coördinate numerous scattered publications on problems of puering and bating.

Tanning. Contributions to the Theory of Vegetable Tanning, H. G. Bungenberg de Jong. Am. Leather Chemists Assn.—Jl., vol. 19, no. 1, Jan. 1924, pp. 14-57, 4 figs. Dehydration of lyophilic sols and gels by tannins and its bearing on theory of vegetable tanning. Translated from Dutch.

Modern Tanning Processes (Les procédés modernes de tannage), G. Manquat. Technique Moderne, vol. 16, no. 16, Aug. 15, 1924, pp. 548-553, 13 figs. Discusses oil tanning, synthetic tanning, mineral and oil tanning, and gives details of processes and apparatus.

Tannic Acid Tannage, A. W. Thomas and M. W. Kelly. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 800-802, 2 figs. Study of action of simple tannin of known chemical constitution in order to lead ultimately to deeper understanding of vegetable tanning.

Tanning in Mexico, V. A. Wallin. Am. Leather Chemists Assn.—Jl., vol. 19, no. 2, Feb. 1924, pp. 73-81, 2 figs. Review of industry at present, and description of method employed.

Tanning with the Aid of Electricity, R. Ditmar. Chem. & Met. Eng., vol. 31, no. 22, Dec. 1, 1924, p. 856. Electro-osmotic process can now be used with existing tanyard equipment.

Tanning Materials. Chestnut Wood in the Tanning Industry, R. W. Griffith. Jl. of Forestry, vol. 22, no. 5, May 1924, pp. 542-544. Discusses chestnut wood as desirable source of tannin.

Comparative Analysis of Tanning Materials, 1924 Committee Report. Am. Leather Chemists Assn.—Jl., vol. 19, no. 5, May 1924, pp. 249-258. Tables giving results obtained by committee workers on samples of 4 tanning extracts.

Latin America as a Source of Tanning Materials, Otto Wilson. Chem. & Met. Eng., vol. 30, no. 8, Feb. 25, 1924, pp. 303-305, 2 figs. Mangrove jungles and industry; how mangrove is used. See also article by same author, entitled, Latin America's Greatest Contribution to the Tanning Industry, in same journal, no. 9, Mar. 1, 1924, pp. 344-346, 4 figs., discussing quebracho, divi-divi, and other tannin resources.

Tanning Materials Survey. The Problem of Our Commercial Independence in Tanning Materials. Trade Information Bul. (Supp. to Commerce Reports), no. 167, Jan. 2, 1924, 18 pp. Source of foreign tanning materials and nature of monopolies. Figures of domestic production and consumption of raw tanning materials and extracts during 1922, and exact position of tanning industry with reference to outlook for future.

LENSES

Choice of. See PHOTOGRAPHY, Lenses.

Production. Working Processes of Opticians and Their Auxiliaries (Die Arbeitsverfahren des Optikers und seine Hilfsmittel), F. Weidert.

Praktische Maschinen-Konstrukteur, vol. 57, nos. 18 and 22, May 20 and June 17, 1924, pp. 253-257 and 311-313, 22 figs. Discusses in detail various processes in production of lenses and special devices and machines necessary for them.

LEVEES

[See also RIVERS, Levees.]

Dredge Work, Electric-Hydraulic. Electric-Hydraulic Dredge Work on Illinois Levees. Eng. News-Rec., vol. 92, no. 22, May 29, 1924, pp. 944-945, 4 figs. Material pumped to enlarge levee and fill burrow pits; special cutter on suction and shutters on discharge pipe.

LEVELING

Methods. A New Scale Graduation (Eine neue Skalateilung), J. W. Dieperink. Zeit. für Instrumentenkunde, vol. 44, no. 9, Sept. 1924, pp. 381-409, 11 figs. Discusses leveling methods and their accuracy; Richards, Pemberton, Nestler, Werffeli, Stephenson, and other measuring rods; and describes new systems of graduation for rods and their practical application.

Precise. Precise Leveling in New England, E. B. Roberts. Boston Soc. Civil Engrs.—Jl., vol. 10, no. 10, Oct. 1924, pp. 283-313, 5 figs. Account of work by U. S. Coast and Geodetic Survey in establishing line of precise level from Providence, R. I., to Portland, Me.; descriptions and elevations of permanent bench marks.

LIFEBOATS

Launching Apparatus. New Apparatus for Launching Lifeboats. Nautical Gaz., vol. 107, no. 4, July 26, 1924, pp. 87 and 103, 4 figs. Liners under construction are being equipped with device which has many advantages over ordinary davits; gravity system of lowering is employed.

LIFTING JACKS

Heavy Weights. Construction and Use of Pressure-Water Lifting Jacks (Bau und Anwendung der Druckwasserhebeböcke), R. Hänchen. Praktische Maschinen-Konstrukteur, vol. 57, no. 24, July 1, 1924, pp. 333-338, 17 figs. Describes operation, use and form of lifting jacks for heavy weights in which water (or oil) is used, as in hydraulic presses.

LIGHT

Cold. See Production in Animals.

Diffraction. Kirchhoff's Theory of Diffraction (Zur Kirhhoffschen Beugungstheorie), A. Rubinowicz. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 339-364. Intensity of illumination behind screen with hole in it, illuminated by point source of light, may be obtained by Kirchhoff-Huyghens principle, as double integral taken over surface bounded by edge of hole; it is possible to reduce this to line integral taken along edge, and author studies approximate evaluation of this integral by use of principle of stationary phase.

Diffuse Reflection. On the Selective Reflection of Light at Diffuse Reflecting Bodies (Ueber die selektive Reflexion des Lichtes an diffus reflektierenden Körpern), G. P. Woronkoff and G. J. Pokrowski. Zeit. für Physik, vol. 20, no. 6, Jan. 11, 1924, pp. 358-370, 11 figs. Experimental investigation of problem, data being included for variety of substances.

Diffusion. Diffusion of Light from a Searchlight Beam, E. Karrer and U. M. Smith. Jl. Optical Soc. of Am. & Rev. Sci. Instruments, vol. 7, no. 12, Dec. 1923, pp. 1211-1234, 14 figs. Definition and importance of diffusion of light; general characteristics of light diffused by small particles; data from searchlight beams; practical importance of light diffused from searchlight beams; color of path of various searchlight beams. Bibliography. Pub. by permission U. S. Bur. Standards.

Dispersion. Light. Sci. Abstracts, vol. 27, no. 319, July 25, 1924, pp. 611-640. Mathematical investigation of effect of mutual influence of molecular scattering and scattering by irregular refraction upon dispersion of light.

Effect of Color on Eyes. Effect of Color of Illumination on Capacity of Eyes (Wird die Leistung des Auges durch die Farbe der Beleuchtung beeinflusst?), O. Schneider. Deutsche Optische Wochenschrift, vol. 10, nos. 36 and 37, Sept. 7 and 14, 1924, pp. 465-468 and 480-482, 2 figs. Capacity and fatigue of eyes as affected by color and application of results.

Effect of Composition on Ocular Functions. Further Studies on the Effect of Composition of Light on Important Ocular Functions, C. E. Ferree and G. Rand. Illuminating Eng. Soc.—Trans., vol. 19, no. 5, May 1924, pp. 424-447 and (discussion) 447-455, 12 figs. Apparatus and method of equalizing saturation and luminosity; acuity; speed of discrimination; eye fatigue with colored lights of equal saturation and brightness, etc.

Fluorescent, from Solids. A New Method for Measuring the Intensity of Fluorescent Light from Solids (Eine neue Methode zur Messung des Fluoreszenzlichtes fester Körper), A. Gyemant. Zeit. für Physik, vol. 26, no. 4-5, Aug. 14, 1924, pp. 223-234, 1 fig. Simple method applicable also to measuring intensity of fluorescence-exciting radiations, such as Röntgen rays; describes two types of apparatus.

Glare. Research on the Phenomenon of Glare (Alcune ricerche sopra i fenomeni di abbagliamento), U. Bordoni. Elettrotecnica, vol. 11, no. 25, Sept. 5, 1924, pp. 585-599, 17 figs. Discusses effect of glare on eye, measurement of light and glare, etc.

Interference. Interference by Diffusion (Interférences par diffusion), F. Wolfers. Académie des Sciences—Comptes Rendus, vol. 179, no. 4, July 28, 1924, pp. 262-263. Mechanism is suggested to explain results previously described; it is supposed that at surface of all bodies resonators exist capable of absorbing energy quanta and of re-emitting them in form of spherical waves.

Measurement. Light and Efficiency of Work. Photometric Magnitudes and Units (La lumière et le rendement du travail. Grandeurs et unités photométriques), E. Marcotte. Arts et Métiers, vol. 77, no. 47, Aug. 1924, pp. 281-286. Discusses light as a factor in industrial production; international photometric units; photometers, lumenmeters, luxmeters, and other measuring instruments.

Measuring Instruments. A New Form of Portable Illuminometer, D. H. Tuck. Optical Soc. Am.—Jl., vol. 9, no. 3, Sept. 1924, pp. 303-308, 3 figs. Describes Holophane Lightmeter, Model D, for measuring illumination intensity, brightness, luminous intensity, luminous flux, reflection factor, absorption factor, transmission factor, and special uses.

Plant Growth, Effect on. Effect of Light on Plant Growth. Illuminating Eng. Soc.—Trans., vol. 19, no. 10, Dec. 1924, pp. 981-1019, 25 figs. Includes following papers: Summary of Literature on Some Phases of Effect of Light on Plant Growth, H. W. Popp; Work to Date at Boyce Thompson Institute for Plant Research on Effect of Light on Plant Growth, J. M. Arthur; Discussion of Work at Boyce Thompson Institute and Its Applications, W. Crocker; Influence of Colored Light on Plant Growth, S. G. Hibben; and Stimulation of Plant Growth by Means of Electric Lighting, V. A. Tiedjens.

Primary Standard. A Primary Standard of Light, Following the Proposal of Waidner and

Burgess, H. E. Ives. Franklin Inst.—Jl., vol. 197, nos. 2 and 3, Feb. and Mar. 1924, pp. 147-182 and 359-400, 41 figs. Feb.: Discussion of existing standards; characteristics which a primary standard should possess; use of platinum in connection with a standard of light; black-body standards; luminous properties of a black body near temperature of melting platinum; development of a special design of platinum black body, and study of its performance. Mar.: Measurements by visual method of brightness of platinum black body at its melting point; measurements by physical photometric method. Bibliography.

Production in Animals. The Production of Cold Light by Living Organisms (Les organismes vivants produisent de la lumière froide), R. Dubois. Nature (Paris), no. 2604, Mar. 1, 1924, pp. 129-131, 5 figs. Discusses mechanism of light production in animals.

Projection of. Studies in the Projection of Light, F. Benford. Gen. Elec. Rev., vol. 27, nos. 8, 9, 10, 11, and 12, Aug., Sept., Oct., Nov., and Dec. 1924, pp. 504-510, 625-633, 698-704, 749-757, and 830-838, 36 figs. Aug.: Energy and light analysis of arc and incandescent searchlights. Sept.: Design of glass paraboloidal mirror. Oct.: Double paraboloidal mirror. Nov.: Surface errors in second-surface mirrors. Dec.: Design and optics of second-surface mirrors.

Quantum Hypothesis. Planck's Law and the Light Quantum Hypothesis (Planck's Gesetz und Lichtquantenhypothese), Bose. Zeit. für Physik, vol. 26, no. 3, Aug. 11, 1924, pp. 178-181. Method for establishment of Planck's law by utilization of light quantum hypothesis in combination with mechanical data, which is independent of classical theory. Note, in conclusion, by Einstein, suggests use of method for application of quantum theory in case of an ideal gas, and promises further remarks on this aspect.

Radiation. The Radiation of Light, H. A. Lorentz. Sci. Monthly, vol. 19, no. 2, Aug. 1924, pp. 170-179, 2 figs. Discusses corpuscular and undulatory or electromagnetic theory of light, radiation pressure, relativity, quantum theory, interference and photoelectric phenomena.

Reflection. Law of Reflection from Moving Mirrors (Les lois de la refléxion sur des miroirs en mouvement), F. Guery. Revue Générale de l'Electricité, vol. 16, no. 10, Sept. 6, 1924, pp. 371-376. Discusses optics of bodies in motion, interpretation of Michelson experiment, Sagnac experiment, theory of Lorentz and Ritz, relativity, ether, etc.

Reflexion of Plane Polarized Light by Etched Metals, O. Jones. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 283, July 1924, pp. 207-216, 3 figs. Plane polarized light reflected normally from etched metal surface changes in intensity when analyzed by nicol prism.

Time of Visual Impression. Some Experiments on the Speed of Vision, P. W. Cobb. Illuminating Eng. Soc.—Trans., vol. 19, no. 2, Feb. 1924, pp. 150-163 and (discussion) 163-175, 6 figs. Contribution to task of working out of a complete law of speed of vision. Shows in what way speed of impression of eye changes with change in brightness-level, under various conditions as to size of test-object, as to necessity for seeing form as against simple recognition of presence of object, and as to presence or absence of confusion due to images of other objects seen immediately before and after test-object.

Velocity. Preliminary Measurement of the Velocity of Light, A. A. Michelson. Franklin Inst. —Jl., vol. 198, no. 5, Nov. 1924, pp. 627-628. Result of observations at Mt. Wilson Observatory in preliminary work is, for velocity of light in vacuo, 299-820 km. per sec.

The Experience of Michelson, the Lorentz Contraction and Relativity (L'experience de Michelson, la contraction de Lorentz et la relativité), E. Brylinski. Revue Générale de l'Electricité, vol. 15, nos. 7, 8, and 9, Feb. 16, 23, and Mar. 1, 1924, pp. 243-250, 283-288, and 339-347, 14 figs. Interpretation of Michelson's experience with ordinary theory of light in assuming that ether is absolutely immobile and velocity of light is independent of velocity of source from which it is emitted; result of investigation shows that hypothesis of contraction of matter in the sense of movement appears improbable and that Michelson's experience cannot be regarded as constituting a verification of postulates which form basis of relativity theory.

Wave-Length Standards. Redetermination of Secondary Standards of Wave Length from the New International Iron Arc, W. F. Meggers, C. C. Kiess and K. Burns. U. S. Bur. Standards—Scientific Papers, no. 478, Jan. 5, 1924, pp. 263-272, 1 fig. on supp. plate. Gives new results for 159 lines between 3370 A and 6678 A, including 84 of international secondary standards.

LIGHTHOUSES

Construction. The Construction of Lighthouse Towers (Construction des tours en mer), G. de Rouville. Annales des Ponts & Chaussées (Partie Technique), vol. 94, nos. 1, 2, and 3, Jan.-Feb., Mar.-Apr., and May-June, 1924, pp. 21-101, 138-196, and 233-281, 57 figs. History of development and problems of design; study of shape and conditions of rock, and movement of water surrounding rock; shape of towers; preliminary work; cleaning and preparation of rock; foundation work; construction of superstructure and fittings; composition and proportioning of materials employed; equipment employed in erection; cost data, etc.

Distance of Penetration of. The Distance of Penetration of Coast Light (De optische dracht van kustlichten), P. Van B. Van Vloten. Ingenieur, vol. 39, no. 5, Feb. 2, 1924, pp. 67-74, 7 figs. Application of Allard formula and empirical method of Zuiver to lighthouses on Dutch coast are compared to actual measurements. Diagrams.

Fog Signal. Lighthouse Service Develops Hygroscopic Fog Signal. Eng. News-Rec., vol. 92, no. 23, June 5, 1924, p. 974, 2 figs. Operation of signals controlled by humidity of atmosphere; striking hammer run by small electric motor.

Luminous Flashing Signals. The Law of the Limiting Perception of Luminous Flashing Signals (Sur la loi de perception à la limite de la portée des eclats des signaux lumineaux), A. Blondel and J. Rey. Académie des Sciences—Comptes Rendus, vol. 178, no. 15, Apr. 7, 1924, pp. 1245-1247. Referring to paper by H. Piéron, authors point out that he has been studying different phenomenon from that which they have been investigating; law established by them is intended solely to apply to best conditions of emission of signals from lighthouses or of similar signals produced by sources which behave for observer as if coming from point sources; observations are meant to apply to maritime signals, in which it is impossible to realize signals of duration less than 1/50 sec.

LIGHTING

[See also ILLUMINATION.]

Art Galleries. Recent Observations and Tests on the Lighting of Picture Galleries and Museums, S. H. Seager. Roy. Inst. Brit. Architects —Jl., vol. 32, no. 4, Dec. 20, 1924, pp. 91-101, 8 figs. Classification of systems; advantages of top-side-lighted rooms; results of tests at different galleries; study of side-lighted rooms.

Automobile Factory. The White Motor Company Improves Illumination, H. Hylkema and H. T. Spaulding. Elec. World, vol. 83, no. 23, June 7, 1924, pp. 1177-1181, 6 figs. How engineering investigation recommended 4957 outlets, raising average intensity to 12 foot-candles; new type of reflector partly lights ceiling; more than 1800 units installed.

Beacon. Beacon Light and Signal Plants According to AGA System (Leuchtfeuer- und Signalanlagen nach dem AGA-System), A. Mellin. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 14, Apr. 5, 1924, pp. 334-338, 9 figs. Discusses illuminating system developed by G. Dalén, based on use of "dissous gas" as illuminating material; this gas, discovered and named by Claude and Hess, consists of acetylene which is dissolved under pressure in acetone and is stored in so-called gas accumulators; its main use is for beacon lights, different types of which are described, including railway signals, car lighting, locomotive, automobile, motor-boat lighting, emergency lighting in operating rooms and power plants, aviation signals, etc.

Building Exteriors. Color Flood-Lighting of Buildings, A. U. Gerber and E. D. Tillson. Illuminating Eng. Soc.—Trans., vol. 19, no. 6, July 1924, pp. 518-530, 5 figs. Details of color lighting of McJunkin Bldg., Chicago; principles underlying use of colors. Abstract of paper read before joint meeting of Illuminating Eng. Soc. and West. Soc. Engrs.

Color Lighting for Building Exteriors, E. D. Tillson. Elec. Wld., vol. 84, no. 21, Nov. 22, 1924, pp. 1090-1094, 5 figs. Principles that must be applied to avoid objectionable effects.

Calculation. Quick Method of Determining a Project for Electric Lighting (Méthode rapide d'établissement d'un projet d'éclairage électrique), J. Wetzel. Électricien, vol. 40, no. 1352, July 15, 1924, pp. 319-321. Discusses determining intensity of light, coefficient of utilization method and simplified method and how to apply it.

Central Stations. The Furtherance of Good Lighting by American Central Stations, John W. Lieb. Illuminating Eng. Soc.—Trans., vol. 19, no. 7, Sept. 1924, pp. 622-637. Central-station view of electric lighting; coöperation between electrical manufacturers and electricity-supply companies; incandescent lamps; lighting equipment; central-station illuminating engineering.

Unusual Phases of Power House Lighting, A. F. Loewe. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 898-900, 2 figs. Illumination of control and distribution room. Consideration of requirements and methods of lighting.

Coal Mines. See COAL MINES, Lighting.

Code. A Code for Lighting (Di un codice della illuminazione), C. Clerici. Elettrotecnica, vol. 11, no. 25, Sept. 5, 1924, pp. 599-608, 12 figs. Discusses rules for lighting of industrial establishments, machine tools, spaces, etc.; advantages of good illumination, etc.

Color Flood Lighting. See Building Exteriors.

Colored. Colored Lighting, M. Luckiesh and A. H. Taylor. Illuminating Eng. Soc.—Trans., vol. 19, no. 2, Feb. 1924, pp. 135-144 and (discussion) 144-149, 7 figs. on supp. plates. Gives spectral limits of the various colors, and relative luminosity of the various portions of spectrum from a 150 or 200-watt gas-filled lamp; characteristics, advantages and disadvantages of various colored media; results of measurement of transmission factors of many samples of such media; describes two examples of recent large installations of colored lighting, with connected-load data. Bibliography.

Daylight. A Portable Instrument for the Direct Measurement of Daylight Factor, A. K. Taylor. Jl. Sci. Instruments, vol. 1, no. 7, Apr. 1924, pp. 214-218, 4 figs. Design and use of simple instrument for direct measurement of daylight factor; it is portable and does not require lamp, battery or other accessory.

Daylighting from Windows, H. H. Higbie and G. W. Younglove. Illuminating Eng. Soc.—Trans., vol. 19, no. 3, Mar. 1924, pp. 235-268, 16 figs. Experimental data covering various points of practical importance and great interest with respect to daylighting of interiors. Actual utilization coefficient for typical daylight illuminations, together with curves and coefficients representing distribution of daylight under a variety of conditions; effect of width of mullions or columns between windows upon distribution of illumination in room, relative effect and efficiency of light from various portions of window area, effect of various methods of controlling light from windows by means of shades and blinds, and effect of dirt accumulations on windows.

Some Principles Governing the Proper Utilization of the Light of Day in Roof Fenestration, W. S. Brown. Illuminating Eng. Soc.—Trans., vol. 19, no. 3, Mar. 1924, pp. 269-287 and (discussion) 288-289, 9 figs. Sources of daylight with which architect has to work are described as regards their intensity, direction, and seasonal and diurnal variation; usual requirements for natural illumination, and general principles governing utilization of latter in roof fenestration; methods of evaluating the three kinds of daylight entering, and examples worked out for certain usual types of roof fenestration.

The Determination of Daylight Intensity at a Window Opening, H. H. Kimball. Illuminating Eng. Soc.—Trans., vol. 19, no. 3, Mar. 1924, pp. 217-234 and (discussion) 288-289, 8 figs. Photometric measurements of sky brightness and determinations of intensity of daylight on horizontal, vertical, and sloping surfaces; method of determining extent of shading of window openings by neighboring buildings; advantage of laying out cities so that streets run NE-SW and NW-SE instead of E-W and N-S; determinations of reflecting power of surfaces of different kinds, and photometric measurements of their brightness under both cloudy and clear-sky conditions; computation of intensity of daylight at a window opening under given conditions.

Developments, 1923. Lighting Developments in 1923, G. H. Stickney. Elec. World, vol. 83, no. 1, Jan. 5, 1924, pp. 38-40, 3 figs. Improvements in illuminants, equipment and practice; notable increase in intensities and wider recognition of values of good illumination; possibilities of future.

Distribution Systems for Public. Distribution Systems for Public Electric Lighting (Sui sistemi di distribuzione della corrente per pubblica illuminazione), G. Storchi. Elettrotecnica, vol. 11, no. 23-24, Aug. 15-25, 1924, pp. 564-566, 2 figs. Critical review of series and parallel systems of feeding lamps for public lighting; copper economy, simplicity of cable laying, absence of junction boxes, uniformity in brilliancy of lamps and other reasons lead author to conclusion that best is series system.

Equipment Depreciation. Depreciation of Lighting Equipment Due to Dust and Dirt, E. A. Anderson and J. M. Ketch. Illuminating Eng. Soc.—Trans., vol. 19, no. 1, Jan. 1924, pp. 55-65 and (discussion) 65-86. Report of tests under service conditions to determine relative depreciation or loss in efficiency. Possibilities of a simple comparison standard for predicting depreciation rates in a particular installation.

Eye, Effect on. Illumination and the Eye (L'occhio umano e l'illuminazione), L. F. Pello. Elettrotecnica, vol. 11, no. 23-24, Aug. 15-25, 1924, pp. 548-551, 2 figs. Résumé of effect on performance of eye produced by different factors

in illumination, such as intensity, distribution and diffusion, steadiness, color, and glare; points out necessity for close coöperation between oculist and illuminating engineer.

Factories. Rules and Regulations for the Illumination of Factories and Other Industrial Workshops (Leitsätze für die Beleuchtung von Fabriken und anderen gewerblichen Arbeitsstätten), H. Lux. Licht u. Lampe, no. 10, May 8, 1924, pp. 255-257. Established by a number of interested German societies and authorities.

The Relation of Illumination to Production, W. E. Bush. Eng. Production, vol. 7, no. 140, May 1924, pp. 124-129 (includes discussion), 14 figs. Foot-candle meter; shadows; illumination and vision; effect of light on output.

Foundries. How to Illuminate Foundries, W. H. Rademacher. Iron Trade Rev., vol. 75, no. 12, Sept. 18, 1924, pp. 741-745, 3 figs. Explains essential differences between hit-or-miss methods and scientific use of modern electric lamps. Benefits derived through better production, with safety.

Fundamental Principles. The Effects of Quantity and quality of Illumination Upon the Human Eye and Vision, C. Sheard. Safety Eng., vol. 47, no. 2, Feb. 1924, pp. 91-98. Fundamental principles of good lighting, including quantity of light; kinds and effect of glare; quality of light and conditions to be avoided.

Gas, High-Pressure. High-Pressure Lighting in Paris, G. Reclus. Gas Jl., vol. 167, no. 3193, July 23, 1924, pp. 379-382, 14 figs. More than 5500 lamps giving total luminous output of 9,000,000 candlepower spread over 95 km. of streets is extent of high-pressure gas lighting of Paris; discusses history, mains and compressor stations, types of lamps, control and cost of installation and upkeep.

Globes. See Street.

Halls. Illumination Requirements of Halls and Means of Light Technics (Anforderungen an die Beleuchtung von Sälen und die Mittel der Lichttechnik), P. Heyck. Elektrotechnik u. Maschinenbau, vol. 42, no. 29, July 20, 1924, pp. 201-208, 28 figs. (Lichttechnik). Discusses avoidance of intense shadows, protection of eyes, proper position of lights, direct, semi-direct and indirect lighting number of lamps, etc.

Highways. Highway Lighting and Public Safety, G. A. B. Halvorsen, Jr., and S. C. Rogers. Nat. Safety News, vol. 10, no. 3, Sept. 1924, pp. 35-36, 4 figs. Discusses correct lighting of automobile roads with particular reefrence to "S" curves.

See also Street.

Holland. Public Lighting in Holland (L'éclairage public en Hollande), La Haye. Société Française des Electriciens—Bul., vol. 4, no. 37, July 1924, pp. 633-642, 10 figs. Lighting arrangements at The Hague, Scheweningen, Amsterdam, Utrecht and Rotterdam. Lighting is intense but there is little uniformity. Comparison with Parisian conditions.

Industrial. Conditions Which Should Be Fulfilled in the Lighting of Industrial and Commercial Establishments (Les conditions à remplir dans l'éclairage des établissements industriels et commerciaux), M. Leblanc. Revue Générale de l'Electricité, vol. 16, no. 20, Nov. 15, 1924, pp. 800-802. Proposes lighting of a specified number of lux for various operations in chemical, paper, printing, tanning and other industries.

Industrial and Commercial Buildings. The Lighting of Industrial and Commercial Buildings (L'éclairage des locaux industriels et commerciaux), J. Lynn. Génie Civil, vol. 84, no. 18, May 3, 1924, pp. 417-420, 9 figs. Physiological effects of luminous radiations; selection of lamps.

Industrial, Unit Costs of. Unit Costs of Industrial Lighting, D. H. Tuck. Illuminating Eng. Soc.—Trans., vol. 19, no. 5, May 1924, pp. 411-419 and (discussion) 419-423, 1 fig. Unit costs of installation and operation of various actual systems of lighting in industrial plants; value of unit costs is in comparing economy of installation and operating costs of various types of lighting and in arriving at quick estimate of cost of any industrial lighting installation when area to be illuminated, foot-candle intensity to be obtained and type of equipment to be used are known.

Installations. Modern Lighting Installations (Impianti moderni di illuminazione), D. Pagani. Industria, vol. 38, no. 15, Aug. 15, 1924, pp. 417-422, 19 figs. Discusses curve of radiation of lights and lamps, horizontal and vertical lighting, intensity of light, interior and street lighting, types of lamps used and their efficiency.

Interior. Experiments in Interior Lighting Alcuni dati sperimentali sulla illuminazione degli ambienti interni), G. Someda. Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 664-666, 5 figs. Details of experiments made in a room without windows with carbon, half-watt, and one-watt lamps, and of experiments on effect of color of walls, diffusion of light by walls, etc.

Italy. The Illuminating Situation in Italy (La nostra situazione in illuminazione, a che punto siamo e dove dobbiamo tendere), G. Peri. Elettrotecnica, vol. 11, no. 26, Sept. 15, 1924, pp. 629-635, 12 figs. Discusses consumption of electricity, most economic intensity for industrial lighting, street lighting, etc.

Light Intensity. Physiologic Considerations in Examination of Lighting Plants (Physiologische Betrachtungen zur Beurteilung von Beleuchtungsanlagen), L. Schneider. Zeit. für technische Physik, vol. 5, no. 10, 1924, pp. 468-471. Contends that intensity of light is main consideration in street lighting; condemns wide angle reflectors and prisms.

Machine Shops. Electric Lighting Plans for Machine Tools (Ueber die Projektierung elektrischer Beleuchtungsanlagen für Werkzeugmaschinen), H. Müller. Elektrotechnischer Anzeiger, vol. 41, nos. 84, 85-86, and 87-88, May 24, 28, and 31, 1924, pp. 428-430, and 436 and 438, and 444-445. Discusses kinds of illumination, distribution of light, globes, bulbs, individual and general lighting, etc.

Good Lighting Equipment Pays, J. J. McLaughlin. Am. Mach., vol. 61, no. 7, Aug. 14, 1924, pp. 253-256, 9 figs. Advantages of good lighting system; proper position and spacing of units for machine shops; saving through periodical cleaning of equipment.

Measurement. Effective Light in Lux and Light Density in Lumen ("Erhellung" in Lux und "Leuchtdichte" in HK/qcm), L. Bloch. Licht u. Lampe, no. 19, Sept. 11, 1924, pp. 523-526. Terminology and magnitudes used and proposed for measuring effects of light. Gives list of sources of light (oil, gas, electricity) and numbers for their density, lux, lumen, etc.

Methods. Modern Methods of Artificial Illumination, A. L. Powell. Am. Architect, vol. 125, no. 2438, Jan. 30, 1924, pp. 133-139, 8 figs. Desirable qualities of an illuminant, desirable qualities of illumination, and discussion of standard types of equipments which have diversified applications for different classes of service.

Mines. Improved Lighting Underground. Colliery Engr., vol. 1, no. 5, July 1924, pp. 233-236. Discusses advantages and drawbacks of Prof. Thornton's proposed system of safe electric lighting.

Modern. Modern Solutions of Lighting Problems (Les solutions modernes des problèmes

d'éclairage), M. E. Darmois. Société Industrielle de l'Est—Bul., no. 173, Apr.-May-June, 1924, pp. 15-30, 7 figs. Discusses lighting as factor in works, efficiency, number of accidents, sanitation; photometric units, tungsten-filament lamps, reflectors, calculation of lighting, etc.

Nomenclature and Standards. Recent Developments in Nomenclature and Standards. Illuminating Eng. Soc.—Trans., vol. 19, no. 1, Jan. 1924, pp. 7-16. Progress made during 1923 in revision of Illuminating Engineering Nomenclature and Photometric Standards previously prepared by I. E. S. committee and approved as American Standard by Am. Eng. Standards Committee. Presents questions for consideration on which it is desired to have discussion and advice, among which are definition of "light" and "lighting," matter of "brightness" and units to be used in measuring it, and use of term "luminaire."

Office and Plant Building. High-Intensity Illumination. Elec. World, vol. 84, no. 18, Nov. 1, 1924, pp. 943-949, 23 figs. Describes lighting equipment installed in offices and plant of McGraw-Hill Co. in New York City; problems encountered and types of equipment required.

Outdoor Advertisements. The Use of Light for Outdoor Advertisements, G. P. Garbett. Illuminating Engr., vol. 17, no. 4, Apr. 1924, pp. 38-43. Short history of electric sign; discusses construction, lamps, switch-gear, restrictions and color of lamps.

Principles. Modern Principles of Artificial Lighting (Principes moderns de l'éclairage artificiel), E. Darmois. Technique Moderne, vol. 16, no. 23, Dec. 1, 1924, pp. 805-811, 11 figs. Photometric units; sources of light; properties of eye, and glare; installation of lamps; etc.

Problems. Working with the Architect on Difficult Lighting Problems, A. D. Curtis and J. L. Stair. Illuminating Eng. Soc.—Trans., vol. 19, no. 1, Jan. 1924, pp. 43-54 and (discussion) 65-86, 15 figs. Emphasizes necessity for early consultation between architect and lighting man in planning of lighting features of a building as well as responsibility of lighting man in developing in himself an appreciation of architectural values so as to most intelligently work with his architectural colleague. Gives some specific examples of lighting problems to illustrate advantages to be derived by considering lighting as a component part of structure.

Progress. Progress in the Art of Illumination, A. Bishoff. Illuminating Eng. Soc.—Trans., vol. 19, no. 1, Jan. 1924, pp. 17-27. Progress made from Jan. 1, 1900, to July 31, 1923, as evidenced by number of patents granted by U. S. Patent Office. Brief discussion of more active branches is given to indicate trend of thought followed by inventors.

The Year's Progress in Illumination, 1923-1924. Illuminating Eng. Soc.—Trans., vol. 19, no. 8, Oct. 1924, pp. 711-800. 1924 report of Committee on Progress. Deals with gas; incandescent electric and arc and vapor tube lamps; lamps for projection purposes; street lighting and other exterior illumination; interior illumination; luminaires; photometery; physics; physiology; illuminating engineering. Bibliography.

Quality of. Quality of Lighting (Die Güte der Beleuchtung), J. Teichmüller. Elektrotechnische Zeit., vol. 45, no. 38, Sept. 18, 1924, pp. 1000-1002. Standards of German Electric Assn. and their shortcomings; light intensity, uniformity, color, shades, etc.

Railway Shops. See RAILWAY SHOPS, Lighting.

Railway Yards. See RAILWAY YARDS, Flood Lighting.

Reflectors. Reflectors and Diffusers in Interior Lighting (Riflettori e diffusori esaminati in rapporto alla illuminazione degli ambienti interni), S. Rebecchni. Elettrotecnica, vol. 11, no. 28, Oct. 5, 1924, pp. 695-699, 6 figs. Discusses direct, indirect, and semi-indirect systems of lighting; types of reflectors and diffusers used; and results of experiments to establish their merits.

Requirements. Physiological Requirements of Good Illumination and Their Realization in Practice (Die physiologischen Forderungen an eine gute Beleuchtung und ihre Verwirklichung in der Praxis), Schneider. Elektrotechnik u. Maschinenbau, vol. 42, no. 37, Sept. 14, 1924, pp. 277-283 (Die Lichttechnik), 18 figs. Structure and function of eye as affected by illumination; direct and indirect lighting; glare; projection of light, etc.

Research. Co-ordination of Research in Illuminating Engineering and Some Practical Applications, J. S. Dow. Illuminating Engr., vol. 17, no. 1-3, Jan.-Mar. 1924, pp. 6-15 and (discussion) 16-18. Classification of research; research on photometry and standards of light; illuminants and lighting appliances; research on glare; collection of statistical data on illumination; facilities for research.

Room, Calculation. The Calculation of Electric Lighting Plants (Die Berechnung elektrischer Beleuchtungsanlagen), F. Knepper. Licht u. Lampe, no. 4, Feb. 14, 1924, pp. 76-79. Discusses methods of calculating lighting requirement of a room.

Roundhouses. See RAILWAY SHOPS, Lighting.

School Buildings. Code of Lighting School Buildings. Illuminating Eng. Soc.—Trans., vol. 19, no. 5, May 1924, pp. 375-410, 21 figs., partly on supp. plates. Revision of Illuminating Eng. Soc.'s code issued in 1918.

Scientific, Application in Practice. The Application of Scientific Illumination in Practice, G. Herbert and R. A. Ives. Illuminating Engr., vol. 16, no. 10-12, Oct.-Dec. 1923, pp. 233-238 and (discussion) 238-242. Discusses importance of data, fundamentals of good lighting, relation between accidents and inadequate lighting, and shows how good illumination contributed to productive efficiency.

Ships. See SHIPS, Lighting.

Steel Works. See STEEL WORKS, Lighting.

Street. A Study of the Street Lighting Systems with Recommendations. Mun. & County Eng., vol. 67, no. 3, Sept. 1924, pp. 111-115, 1 fig. Full text of report of Joint Committee on Street Lighting of N. Y. State Conference of Mayors and Other City Officials and Empire State Gas & Elec. Assn. as presented on June 3, 1924.

Asymmetric Illumination Distribution for Ornamental Street Lighting, L. A. S. Wood. Elec. World, vol. 83, no. 20, May 17, 1924, pp. 999-1003, 8 figs. Sheridan Road installation in Chicago meets high-intensity lighting requirements economically and esthetically by directing greatest density at angle of 22½ deg. from curb line.

Common Return for Street Lighting, H. Richter. Elec. World, vol. 84, no. 16, Oct. 18, 1924, pp. 831-833, 2 figs. Advantages and disadvantages of system; field experience and methods for testing and maintenance; use of common-neutral network system.

Hollywood's Street-Lighting Installation, O. J. Helvey. Elec. Wld., vol. 84, no. 23, Dec. 6, 1924, pp. 1201-1202, 4 figs. Specially designed standards and lamps combine beauty with effective illumination; flexibility of posts an important feature; costs of installation and maintenance.

Maywood Street-Lighting System, F. Woodmansee. Elec. Wld., vol. 84, no. 6, Aug. 9, 1924, pp. 257-260, 6 figs. Complete installation of

1784 lamps with individual disconnecting transformers in base of posts costs $270 per lamp; 360 kw. compact-ring bus substation serves 12 circuits for suburb of 12,000 people (Maywood, Chicago, Ill.).

Model State Law for Street and Highway Lighting. Mun. & County Eng., vol. 67, no. 4, Oct. 1924, pp. 191-197. Presents a model law covering every class and condition of public lighting and embodying all good points of previous legislation, prepared by coöperation of legal and scientific minds.

Municipal Lighting Plant of Milan (L'impianto di illuminazione pubblica di Milano). Elettrotecnica, vol. 11, no. 27, Sept. 25, 1924, pp. 667-673, 5 figs. Development of plant, distribution and control, transformers, distance-control apparatus, lamp ports and lamps, consumption of current, rates and cost of service.

Proposed Improved Street Lighting Design for the City of Cleveland, Ohio, W. Harrison and O. F. Hass. Safety Eng., vol. 47, no. 5, May 1924, pp. 234-237 and 239, 3 figs. Old system and primary design of new system with approximate cost and other data for new.

Recent Advance in Street Lighting Methods, S. B. Hood. Elec. Light & Power, vol. 2, no. 8, Aug. 1924, pp. 13-15 and 58, 5 figs. Details of application at Minneapolis of low-voltage multiple supply in preference to more commonly used high-voltage series systems.

Recent Developments in Street Lighting, J. T. Rood. Wis. Engr., vol. 28, no. 7, Apr. 1924, pp. 135-137 and 152-153. Discusses arc lamp, incandescent lamp, probable future developments, and lighting of main business sections, residence and secondary business sections, outlying residential sections, and outlying highways.

Some Facts About Street Lighting, G. H. P. Dellman. Jl. of Elec., vol. 52, no. 11, June 1, 1924, pp. 404-408. Review of practice, showing changes which street lighting systems have undergone in past years; modern practices; essential features of proper lighting; methods and financing of lighting, etc.

Some Notes on Street Lighting, P. S. Millar. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 495-503, 9 figs. Test data upon certain sizes and types of incandescent lamps for street lighting; present status of street lighting; presentation of selected list of modern lamp posts and lighting equipments; data to show character of installations recommended by experts for lighting of various classes of streets.

Street Lighting (Verkehrsbeleuchtung), J. Schaer. Elektrotechnische Zeit., vol. 45, nos. 25 and 26, June 19 and 26, 1924, pp. 641-646 and 684-688, 17 figs. Discusses illumination of horizontal as well as vertical planes, quality as opposed to strength of illumination; recommends double dioptric globes. Design of street lighting systems.

Street Lighting and Visability, E. J. Stewart. Gas Wld., vol. 81, no. 2097, Sept. 27, 1924, pp. 311-315 and (discussion) 315-317. Discusses functions of street lighting, methods of measurement, factors concerned in visibility, lighting name-plates, etc. Abstract of paper read before Instn. Pub. Lighting Engrs. meeting, Glasgow.

Street Lighting Glassware, F. Benford. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 304-312, 14 figs. Design of globes for street lamps.

Street Lighting in Its Relation to Highway Safety, C. A. B. Halborson, Jr., and S. C. Rogers. Safety Eng., vol. 47, no. 6, June 1924, pp. 283-289, 13 figs. Objects should be seen at night in silhouette rather than by direct light; glare; cost of lighting; use of signals, etc.

Street Lighting Planning and Judging, A. F. Dickerson. Elec. Light & Power, vol. 2, no. 11, Nov. 1924, pp. 23-25, 92 and 97, 2 figs. Modern practice; planning street lighting; costs, appearance and depreciation.

The Columbus Street Lighting Demonstration, F. C. Caldwell. Illuminating Eng. Soc.—Trans., vol. 19, no. 7, Sept. 1924, pp 675-678. Discusses various types of street lighting exhibited on streets of Columbus, Ohio.

Textile Mills. Developments in Mill Lighting, R. A. Palmer. Textile World, vol. 65, no. 5, Feb. 2, 1924, pp. 419-420, 4 figs. Studies show importance of speed of vision in manufacturing operations; higher intensities being employed; effect on production and accidents; development in suspension of units which facilitates maintenance of lighting equipment.

Some Problems in the Daylight Lighting of Textile Factories, P. J. Waldram. Illuminating Engr., vol. 17, no. 5, May 1924, pp. 79-87, 12 figs. Deals with lighting needs of cotton industry so far as relates to spinning of raw cotton into yarn and weaving of latter into cloths and sheetings.

Traction Vehicles. Some Notes on Traction Lighting by Electricity, J. F. Caine and E. A. Marx, Jr. Illuminating Engr., vol. 17, no. 1-3, Jan.-Mar. 1924, pp. 19-25 and (discussion) 25-28, 4 figs. Railway-carriage, tram, and bus lighting; drivers' compartments; lighting of railway platforms, station names, etc.; lamps, and voltage.

Train. Report of Committee on Illumination. Ry. Elec. Engr., vol. 15, no. 10, Oct. 1924, pp. 312-335, 18 figs. Deals with following subjects: Incandescent lamps for train-lighting service and for locomotive service; digest of industrial lighting codes issued by various states; flood-lighting system of illumination for railroad yards; manual of lighting practice for railroads; reflectors and enclosing glassware. Includes tables giving coefficients of utilization, computed illumination values, etc. Bibliography. Report before Assn. Ry. Elec. Engrs.

Tunnels. Study of Lighting for Hudson River Vehicular Tunnel, B. E. Shackelford and D. W. Atwater. Illuminating Eng. Soc.—Trans., vol. 19, no. 7, Sept. 1924, pp. 638-661, 14 figs. Power requirements for tunnel lighting; comparative equipment costs; comparative methods of various systems; model tunnel and tests; present standards of illumination in foot-candles for street lighting; proposed unit and tests; outdoor test installations.

LIGHTMETER. See LIGHT, Measuring Instruments.

LIGHTNING

Arresters. See LIGHTNING ARRESTERS.

Protection Against. Atmospheric Electric Phenomena and the Protection of Buildings from Discharges During Thunder Storms (I fenomeni elettrici dell'atmosfera e la protezione degli edifici dalle scariche temporalesche), U. Bordoni. Elettrotecnica, vol. 11, nos. 9, 10, 11, and 12, Mar. 25, Apr. 5, 15, and 25, 1924, pp. 190-195, 213-222, 240-245, and 261-270, 4 figs. Comprehensive monograph including a bibliography of 50 important references.

Electric Thunderstorm Field Researches, H. Norinder. Elec. World, vol. 83, no. 5, Feb. 2, 1924, pp. 223-226, 9 figs. Investigation shows that good line and transformer insulation affords better protection against surges and is superior to horn gaps and lightning arresters.

Protection Against Lightning, A. M. Schoen. Safety Eng., vol. 47, no. 3, Mar. 1924, pp. 109-117. Nature and characteristics of lightning and lightning discharges; statistics; suggestions for protection.

Thunderstorm Researches Versus No Lightning Arresters, E. E. F. Creighton. Elec. World, vol. 83, no. 11, Mar. 15, 1924, pp. 521-523. Comments on article by H. Norinder in same journal, Feb. 2, 1924, describing researches on thunderstorm fields in Sweden and giving conclusions for application to system-protective devices.

LIGHTNING ARRESTERS

Application of. Lightning Arrester Application from the Economic Standpoint, A. L. Atherton. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 813-817, 4 figs. Evaluates extent and cost of failures to average system, if entirely unprotected, with assumption that yearly expense so incurred may justifiably be spent for lightning arresters. Minimum transformer size for which protection is warranted.

California Experience. Lightning Arrester Experience in California, E. R. Stauffacher. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp, 660-665, 7 figs. Discusses experience, particularly as regards Southern Cal. Edison Co.'s system.

Corona as. The Corona as Lightning Arrester, J. B. Whitehead. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 914-922, 10 figs. Experiments are described indicating relatively simple and inexpensive method of equipping transmission lines to take advantage of protective properties of corona, without incurring its disadvantages.

Grounds. Lightning-Arrester Grounds, H. M. Towne. Elec. World, vol. 83, nos. 3 and 4, Jan. 19 and 26, 1924, pp. 131-135 and 183-187, 16 figs. Characteristics of pipe grounds; resistance of grounds; artificial treatment of soils; maintenance, installation and testing of grounds; ground connections for different service conditions; multiple-ground electrodes; dissipation of energy in grounds.

Ideal, Design of. On the Behavior of Discharges as a Lightning Arrester, J. Okochi. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 432, July 1924, pp. 624-650, 28 figs. Shows that arrester having series gap as in modern practice is undesirable, but that it is possible to design truly ideal lightning arrester by combination of principles of ideal discharger and of ideal high-frequency energy absorber; explains principle of high-frequency energy absorber designed by author. (In Japanese.)

Surge Type. Lightning Arresters, C. E. Bennett. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 791-797, 14 figs. Describes a surge arrester, composed of two essential parts; liquid resistance, and high-speed gap, which are explained separately. See (discussion) in vol. 44, no. 1, Jan. 1924, pp. 76-79, 1 fig.

LIGHTSHIPS

Diesel-Electric. See MOTORSHIPS, Diesel-Electric Lightships.

Radio Equipment. See RADIOTELEPHONY, Lightships.

LIGNITE

Automobile Fuel from. See AUTOMOBILE FUELS, Lignite as Source of.

Boiler Firing with. See BOILER FIRING, Lignite.

Boiler Furnaces for. See BOILER FURNACES, Lignite.

Briquetting. Degasification of Lignite Briquets (Ueber die Entgasung von Braunkohlenbriketts), A. Müller. Gas- u. Wasserfach, vol. 67, no. 11, Mar. 15, 1924, pp. 137-138. Discusses use of lignite dust for distillation so as to produce coke in form of briquets; this coke replaces coke from coal at considerable saving.

Lignite Briquets as Fuel (Das Braunkohlenbrikett als Brennstoff), Pradel. Feuerungstechnik, vol. 12, no. 22, Aug. 15, 1924, pp. 181-183. Increased lignite mining in Germany. Briquetting and use of briquets for industrial and domestic purposes.

The Manufacture of Brown Coal Briquettes—South Australia's Potential Industry, H. Basedow. Serial article in Indus. Australian & Min. Standard, vol. 71, nos. 1847-1853, May 1-June 12, 1924. General outline of briquetting process as author studied it on brown coal fields of Silesia and Rhineland of Germany.

Carbonization. Hydrogen and Nitrogen in Low-Temperature Gases (Wasserstoff und Stickstoff in Schwelgasen), Erdmann. Braunkohle, vol. 23, no. 37, Dec. 13, 1924, pp. 685-689. Results of experiments showing presence of H even at very small pressures in retort, and appearance of free N between 180 and 325 deg.

Lignite Carbonization, W. W. Odell. U. S. Bur. Mines—Reports of Investigations, no. 2569, Feb. 1924, 6 pp. Figures showing what proportion of fuel requirements of Northwest is industrial or domestic fuel, and what proportion of lignite consumed is used for domestic purposes; notes on carbonization products; briquetting raw lignite.

Low-Temperature Carbonization, Particularly of Lignites (La carbonisation à basse température, en particulier celle des lignites), C. Berthelot. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 123, no. 1, Jan. 1924, pp. 44-46, 9 figs. Definition and realization of low-temperature carbonization, and its practical importance in metallurgical-coke industry; low-temperature carbonization of lignite.

Chars. Ignition Temperature of Some Lignite Chars (Entzündungstemperaturen einiger Braunkohlengruden), A. Faber. Braunkohle, vol. 23, no. 22, Aug. 30, 1924, pp. 430-432. See also Gas- u. Wasserfach, vol. 67, no. 45, Nov. 8, 1924, pp. 680-682. Results of experiments to determine temperature of spontaneous combustion of four kinds of char.

Conveying. Recent Experiences in Pneumatic Transportation in the Briquet Factories in the Lignite Regions on the Rhine (Neuere Erfahrungen über pneumatische Förderung in Brikettfabriken des rheinischen Braunkohlenreviers), A. Haarmann. Braunkohle, vol. 23, no. 5, May 3, 1924, pp. 81-86, 7 figs. Methods of transportation of fine grain lignite and lignite dust are described and their economical advantages are analyzed.

Use and Economics of Chain Railways in Open-Workings of Lignite (Anwendbarkeit und Wirtschaftlichkeit der Kettenbahn- und der Zugförderung im Braunkohlentagebau), A. Ohnesorge. Braunkohle, vol. 23, no. 28, Oct. 11, 1924, pp. 521-527, 2 figs. Discusses use of chain-railway system using mine cars, field of its application, and cost. Conveying by train system.

Distillate. See Fuels.

Distillation. See PEAT, Distillation.

Distillation, Furnaces for. Historical Development of the Rolle Furnace Up to the Present Time (Die geschichtliche Entwicklung des Rolle-Ofens bis zur Neuzeit), A. Thau. Braunkohle, vol. 23, no. 2, Apr. 12, 1924, pp. 17-32, 30 figs. on supp. plates. Development of these furnaces, which serve the purpose of distilling lignite, extends over three-quarters of a century. Rolle's designs, of which a large number are illustrated and described, have not been materially improved upon by later designers.

Drying. Drying and Distillation of Lignite by Internal Heating (Braunkohlentrocknung und -Schwelung durch Innenheizung), O. Hubmann. Braunkohle, vol. 23, nos. 28 and 29, Oct. 11 and 18, 1924, pp. 527-531 and 542-545, 4 figs. De-

tails of Lurgi process for producing tar and coke from lignite of high water content; results of test.

Heat Economics at the First Rhine Lignite Fair (Die Wärmewirtschaft auf der ersten rheinischen Braunkohlenmesse), M. Grunewald. Archiv für Wärmewirtschaft, vol. 5, no. 8, Aug. 1924, pp. 145-150, 10 figs. Discusses drying plants for dust and briquets, drying of crude lignite, conveying and firing of coal dust, gas production from lignite and briquets, gas scrubbing and tar production plants, furnaces and boilers, etc.

Fires in Mines. Causes, Prevention and Fighting of Fires in Lignite Mines (Ursache, Verhütung und Bekämpfung von Flözbränden beim Braunkohlentiefbau), G. Kain. Braunkohle, vol. 23, no. 31, Nov. 1, 1924, pp. 572-574, 4 figs.

Fuel, Utilization as. Lignite Fuel Source of Heat for Industries, W. Roth. Gas Age-Rec., vol. 53, no. 22, May 31, 1924, pp. 763-764. Recent developments in Germany, described by editor of Chemiker Zeitung, including gas from lignite, by-products from lignite, and lignite for central stations.

Gasification. Burning and Gasification of Lignite (Verschwelung und Vergasung von Braunkohle), C. Arnemann. Zeit für angewandte Chemie, vol. 37, no. 37, Sept. 11, 1924, pp. 713-721, 13 figs. Processes of low-temperature gasification and gas producers used.

Gasification of Moist, Earthy Raw Lignite (Betriebsmässige Vergasung von grubenfeuchter erdiger Rohbraunkohle), K. Bunte. Gas- und Wasserfach, vol. 67, no. 24, June 14, 1924, pp. 344-348, 4 figs. Discusses composition of lignite (55 per cent H_2O), analysis and properties; describes eperimental plant, gives results of gasification, details of 6 days' working of Francke generator, etc.

Progress in the Gasification of Lignite (Fortschritte auf dem Gebiete der Braunkohlenvergasung), Theiler. Feuerungstechnik, vol. 12, no. 6, Dec. 15, 1923, pp. 4-45, 1 fig. Gas furnaces, producer gas and lignite gasification; producer-gas stations; influence of gas cleaning; combined gasification and distillation; low-temperature tar; economy of distillation producer plant with low-temperature-tar recovery.

Results of Prize Competition on Gasification of Lignite (Die Ergebnisse des Preisausschreibens über Rohbraunkohlenvergas-ung der Brennkrafttechnischen Gesellschaft E. V.), Brennstoff- u. Wärmewirtschaft, vol. 6, no. 5, May 1924, pp. 89-124, 6 figs. Competition arranged by Brennkrafttechnische Gesellschaft E. V. for model plant treating on unscreened material of 56 per cent water, 5 per cent tar and 7 per cent ash, capacity of 20 tons per 24 hr.; gives papers of first and second award.

German Production, 1923. Lignite Mining in Central Germany in 1923 (Der mitteldeutsche Braunkohlenbergbau im Kalenderjahr 1923), W. Pothmann. Braunkohle, vol. 22, no. 48, Mar. 1, 1924, pp. 723-728, 2 figs. Statistics of production.

Mine Management. Psychotechnical Rationalizing of Lignite Mining Operations (Psychotechnische Betriebsrationalisierung im Braunkohlenbergbau), G. Nicolai. Braunkohle, vol. 23, no. 32, Nov. 8, 1924, pp. 585-593. Deals with scientific management applied to mine officials and workers.

Mines, Germany. Critical Discussion of Underground Mining Methods Employed in Lignite Mines of Central Germany (Kritische Betrachtung des im mitteldeutschen Braunkohlenbergbau unter Tage üblichen Abbauverfahrens), W. Hoffmann. Braunkhole, vol. 22, no. 49, Mar. 8, 1924, pp. 741-752, 18 figs. Recent experiments and recommendations for improvements.

Mining. Electric Drive of Dredges and Locomotives in Lignite Mining (Elektrischer Antrieb von Baggern und Abraumlokomotiven im Braunkohlenbergbau), M. Philippi. Braunkohle, vol. 23, no. 18, Aug. 2, 1924, pp. 320-333, 24 figs. Discusses cascade and rotary converters, mercury-vapor rectifiers, locomotives for stripping operations; bucket dredges with electric drive control, coal planers used in stripping operations, etc.

Improvements in Lignite Mining on the Rhine (Neuerungen in rheinischen Braunkohlenbergbau), G. Zahn. Braunkohle, vol. 23, no. 34, Nov. 22, 1924, pp. 634-636, 4 figs. Describes lubricating devices for rapid lubrication of journal bearings, and of adjustable plow for coal- and stripping- dredges.

Open Working Operations and Rational Management (Der Tagebaubetrieb und die rationelle Betriebsführung), Ehlers. Braunkohle, vol. 23, no. 35, Nov. 29, 1924, pp. 649-651, 3 figs. Describes Buckau and Lübeck dredges of 810 cu. cm. and 360 cu. cm. capacity per hour, respectively, and their application in stripping operations.

State Lignite Mine at Häring, near Kirchbichl [Der Bundes-Braunkohlenbergbau in Häring bei Kirchbichl (Tirol)]. Montanistiche Rundschau, vol. 16, no. 18, Sept. 16, 1924, pp. 502-505, 3 figs. Details of present conditions, application of hydraulic mining, machinery equipment, steam and electric winding engines, benzine locomotives, centrifugal pumps, power production, coal washing, etc.

Mining, Strip. Economies of Dry Operation in Lignite Stripping (Ein Beitrag zur Untersuchung der Wirtschaftlichkeit des Trockenkippbetriebes im Braunkohlentagebau), A. Ohnesorge. Braunkohle, vol. 23, no. 15, July 12, 1924, pp. 257-262, 8 figs. Discusses increased use and development of apparatus to reduce expenses consisting mainly in wages; gives examples of ground plows, time study of operations, etc.

Mechanical Tipping in Lignite Stripping (Kippenmechanisierung in Braunkohlen-Tagebaubetrieben), D. F. Brennecke. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 32, Aug. 9, 1924, pp. 817-820, 10 figs. Discusses drawbacks of handtipping, advantages of mechanical tipping, operation, economy and efficiency of various types of tipping apparatus.

Texas Lignite Field Sets Steam Shovel to Work, H. Marshall. Coal Age, vol. 26, no. 13, Sept. 25, 1924, pp. 435-436, 4 figs. Particulars regarding strip mine in Rockdale lignite fields, opened and operated by West. Securities Coal Co., including equipment employed; field contains 20,000,000 tons of finest lignite coal in state.

Moisture Content. The Moisture Content of Lignite, Its Influence on Heating Value and Its Analytic Determination (Der Wassergehalt der Braunkohle, sein Einfluss auf den Heizwert und seine analytische Bestimmung), E. Erdmann. Braunkohle, vol. 23, no. 3, Apr. 19, 1924, pp. 49-56, 2 figs. Investigation of how combustion heat and heating value of coal changes with its moisture content.

Oil Recovery from. Oil Recovery from Lignite (Oelgewinnung aus Braunkohle), A. Faber. Wärme, vol. 47, no. 14, Apr. 4, 1924, pp. 139-141. Oil situation in Germany; methods of producing tar; phenomena occurring with distillation; process of oil recovery in shaft furnaces and rotary drums; tar recovery in producers.

Sardinia. The Gonnesa Lignite Basin (Il bacino lignifero di Gonnesa), M. Taricco. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 2, Aug. 15, 1924, pp. 35-40. Discusses geology, tectonics and extent of lignitiferous basin, analysis of lignite and its uses.

Tar from. See TAR, Lignite.

Texas. The Lignites of Texas and Their Potentialities for Industry and Agriculture, C. F.

Drake. Mfrs. Rec., vol. 85, no. 5, Jan. 31, 1924, pp. 81-82. Notes on deposits and products that can be produced from lignite.

United States. Lignite. W. W. Odell. Minn. Federation of Architectural & Eng. Societies—Bul., vol. 9, no. 9, Sept. 1924, pp. 21-22, 24, 26 and 28. Discusses deposits in Montana, North and South Dakota, and Texas; properties and use of lignites; briquetting; work done by U. S. Bur. Mines.

LIME

Cement. Cement Lime (Zement-Kalke), H. Hirsch. Tonindustrie-Zeitung, vol. 48, no. 83, Oct. 15, 1924, pp. 929-932, 9 figs. on supp. plate. Definition and use; tables of composition and properties; micrographs of various kinds.

Hydrated. Hydrated Lime in Concrete. Contract. Rec. & Eng. Rev., vol. 38, nos. 30 and 31, July 23 and 30, 1924, pp. 743-745 and 761-762, 1 fig. Experimental investigations confirm practical experience that lime in mix facilitates handling and placing of concrete.

Yield of Hydrated Lime from Air-Slaked Lime and Magnesian Limes (Sul rendimento in grasselo delle calci aeree e sulle calci magnesiache), O. Rebuffat. Giornale di Chimica Industriale ed Applicata, vol. 6, no. 7, July 1924, pp. 328-330. Describes apparatus for measuring yield of lime paste (volume for given weight of dry substance) obtainable from air-slaked lime; this yield is not appreciably diminished by presence of magnesia, even in large proportion, and during setting of mortar made with such lime, magnesia undergoes conversion into carbonate.

Hydraulic. Hydraulic Limes, Natural and Artificial, C. R. Platzmann. Rock Products, vol. 27, no. 23, Nov. 15, 1924, pp. 49-51. Comparison with other limes and cements and their properties, uses and manufacture.

Kilns. A Shaft Lime Kiln Designed for Retarded Combustion of Coal Gases, J. C. Schaffer. Rock Products, vol. 27, no. 7, Apr. 5, 1924, pp. 41-43, 2 figs. Furnace built on gas-producer principles and kiln with air inlets above eyes for progressive combustion of gases in kiln.

Factors Affecting the Life of Lime-Kiln Brick Linings, V. J. Azbe. Rock Products, vol. 27, no. 22, Nov. 1, 1924, pp. 30-31, 1 fig. Reasons for failures of linings; choosing brick and laying them properly.

Waste Elimination by the Rotary Kiln for Lime, Chas. Wadsworth, 3rd Chem. & Met. Eng., vol. 30, no. 1, Jan. 7, 1924, pp. 13-16, 9 figs. Installation at Bellefonte plant of Am. Lime & Stone Co. produces high-grade lime from material unburnable in shaft kiln.

Plants. Modern Lime Plant That Makes Own Power. Rock Products, vol. 27, no. 16, Aug. 9, 1924, pp. 38-41, 15 figs. Design and construction of Gager Lime Co.'s plant at Sherwood, Tenn.; hydrating plant consists of large Schaffer continuous hydrator and two Raymond pulverizers and air separation systems of ordinary type; three turbo-generator sets; describes crushing plant.

New Lime-Burning Plant of Union Carbide Company, H. L. Noyes. Eng. News-Rec., vol. 93, no. 14, Oct. 2, 1924, pp. 546-548, 4 figs. Design and layout of plant at Sault Ste. Marie, Mich. Explosive qualities of pulverized coal dictated dust-proof partitions and dust-tight coolers and dryers. Zinc roof insulated from steel purlins.

New Lime Plant of Marble Cliff Quarries Company. Rock Products, vol. 27, no. 6, Mar. 22, 1924, pp. 36-42, 22 figs. Description of Columbus, Ohio, plant, an example of modern tendency to convert all raw material into best commercial form.

New Ohio Plant Completed in Record Breaking Time, C. A. Breskin. Rock Products, vol. 27, no. 17, Aug. 23, 1924, pp. 32-36, 20 figs. Describes hydrate mill of W. L. Urschel Lime & Stone Co.; daily capacity 250 tons of lime and 2000 tons of stone.

U. S. Gypsum's Geno Lime Plant Enlarged. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 86-87, 1 fig. Genoa, Ohio, lime plant of U. S. Gypsum Co., Chicago, has enlarged its plant by addition of 13 new kilns and other equipment; installation includes new gantry crane, second Schaffer hydrator, second Williams swing hammer mill, new power house and additional cooling, grinding and shipping facilities.

Production from Small Stone. The Production of Lime from Small Stone, W. M. Meyers. U. S. Bur. Mines—Reports of Investigations, no. 2596, Apr. 1924, 9 pp. Conversion of small stone into lime is most desirable means of disposal. Difficulty of burning lime in shaft kiln; calcination of small stone impeded by CO gas; possible alterations in shaft kiln construction; use of rotary kiln, its advantages and disadvantages.

Rotary-Kiln Burning. Importance of Uniform Temperature in Lime Burning, M. Brill. Fuels & Furnaces, vol. 2, no. 4, Apr. 1924, pp. 355-357, 4 figs. Use of radiation pyrometers for solving problems in calcining of lime in rotary kilns.

Specifications. Requirements for Lime. Contract Rec. & Eng. Rev., vol. 38, no. 26, June 25, 1924, pp. 648-649. Recommendations accepted as standard for incorporation in building codes.

LIMESTONE

Building Requirements. Building Stone Requirements. Stone, vol. 45, no. 6, June 1924, pp. 349-351, 2 figs. Report of Committee on Building Requirements for Indiana Limestone includes code sections covering all classes of building stone customarily used, thus constituting recommended code of practical value.

Canada. Limestone in Canada (1923). Can. Min. Jl., vol. 45, no. 24, June 13, 1924, pp. 575-576. Résumé of sources, uses, mining and treatment, production and prices, imports and exports, and tariffs.

Jamaica. The Cretaceous Limestones of Jamaica and Their Mollusca, C. T. Trechmann. Geol. Mag., vol. 61, no. 9, Sept. 1924, pp. 385-410, 36 figs. Information on stratigraphy and palaeontology.

Mining. Mining Limestone for Lime Manufacture, O. Bowles. U. S. Bur. Mines—Reports of Investigations, no. 2585, Mar. 1924, 9 pp., 1 fig. See also Cement, Mill & Quarry, vol. 24, no. 9, May 5, 1924, pp. 23-27, 4 figs. Exploitation of limestone deposits by modern methods of underground operation. Growing tendency exists toward underground operation, for quarry owners are faced with increasing difficulties in open pit operation. Conditions encouraging undergound work; disadvantages of mining. Brief descriptions of limestone mines visited by writer, illustrating type of mines now or recently in operation and general mining methods pursued.

Mining Limestone with Shrinkage Stopes, A. B. Parsons. Eng. & Min. Jl.-Press, vol. 118, no. 16, Oct. 18, 1924, pp. 605-609, 11 figs. Underground operations displace open-cut mining at Bellefonte, Pa.

Utah. Petrographic Studies of Limestone Alterations at Bingham (Utah), A. N. Winchell. Am. Inst. Min. & Met. Engrs.—Trans., no. 1322-M, Mar. 1924, 16 pp., 9 figs. Petrographic studies of over 1400 rock and mineral samples, and studies of their field relations; show that there is a complete gradation between sandstone and limestone; lime-silicate rocks were produced by recrystallization of limestone.

The Ores in the Limestone at Bingham, Utah, Rich. N. Hunt. Am. Inst. Min. & Met. Engrs.—

Trans., no. 1323-M, Mar. 1924, 28 pp., 9 figs. Geology; metamorphism of limestone; relation of limestone alterations to ores.

LIMNORIA. See MARINE BORERS.

LINKS

Stresses in. See STRESSES, Links.

LINOLEUM

Manufacture. Modern Floors: Linoleum (La pavimentazione moderna: Il linoleum), F. Barbacini. Industria, vol. 38, no. 19, Oct. 15, 1924, pp. 534-538, 8 figs. Details of processes and machinery used in manufacture.

LIQUID AIR

Blasting. See BLASTING, Liquid-Air.

Equation of State. Equation of State and Diagrams for Air at Low Temperatures (Zustandsgleichung und Schaubilder für Luft bei tiefen Temperaturen), A. Seligmann. Zeit. für die gesamte Kälte-Industrie, vol. 31, no. 11, Nov. 1924, pp. 129-135, 2 figs. Discusses a series of thermodynamic diagrams for dry atmospheric air free from CO_2 with reference to calculation and development of air liquefaction and separation plants.

Liquefaction and Rectification. Calculation of Apparatus for Liquefaction and Separation of Air (Berechnung der Luftverflüssigungs- und Trennungsapparate), V. Fischer. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 25, June 21, 1924, pp. 647-653, 6 figs. Discusses heat equations of interior of separating apparatus, operating pressures for production of gaseous and liquid oxygen, yield in oxygen at given operating pressure and initial temperature.

The Liquefaction and Rectification of Air, L. D. Goldsmith. World Power, vol. 2, nos. 7 and 8, July and Aug. 1924, pp. 29-37 and 108-112, 11 figs. Historical development of air liquefaction; practical methods of liquefaction by Hampson, Linde, and Claude; practical applications; magnitude of industry.

LIQUID OXYGEN

Blasting with. See BLASTING, Liquid Oxygen.

Production. Intense Refrigeration and Technical Oxygen (Tiefkühltechnik und technischer Sauerstoff), A. Neuburger. Dinglers Polytechnisches Journal, vol. 339, no. 15, Mid-Aug. 1924, pp. 141-144, 3 figs. Description of Heylandt system of production and transportation of liquid oxygen.

Production and Technical Use of Oxygen (Ueber die Gewinnung und technische Verwendung von Sauerstoff), B. Simmersbach. Wärme- u. Kälte-Technik, vol. 26, nos. 11, 15, and 16, June 1, Aug. 1 and 15, 1924, pp. 87-90, 126-128, and 133-135. Reviews air-liquefaction processes for production of oxygen, hydrogen, and nitrogen.

Uses. Industrial Possibilities of Liquid Oxygen, L. E. Bedortha. Acetylene Jl., vol. 26, nos. 3 and 4, Sept. and Oct. 1924, pp. 131-134 and 181-182, 1 fig. Discusses development of containers and uses for liquid oxygen. Abstract of paper read before Gas Products Assn. convention.

LIQUIDS

Absorption of Gases by. A Method for Studying the Rapid Absorption of Gases by Liquids; P. G. Ledig and E. R. Weaver. Am. Chem. Soc.—Jl., vol. 40, no. 3, Mar. 1924, pp. 650-657, 9 figs. Describes apparatus which makes possible detailed study of absorption from small bubbles; study of concentration and other variables with particular purpose of determining reproducibility and accuracy of method. Published by permission of Bur. Standards.

Boiling-Point Correction Chart. A Boiling Point Correction Chart for Normal Liquids, W. H. Bahlke and Rob. E. Wilson. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1131-1132, 3 figs. With special application to petroleum products; chart may be used with reasonable accuracy for any of so-called non-associated liquids.

Cohesion Pressure. See GASES, Cohesion Pressure.

Compressible, Vortex Motion in. The Vortex Motion in a Compressible Liquid (Ueber Wirbelbewegung in einer kompressiblen Flüssigkeit), A. Friedmann. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 102-107. Author derives equations on conditions of dynamic possibility of motion of a compressible liquid.

Convection of Heat in. Free Convection of Heat in Liquids, R. A. Nelson. Phys. Rev., vol. 23, no. 1, Jan. 1924, pp. 94-103, 7 figs. Photographic study of convection streams; variation of heat loss with excess temperature of wire over that of liquid.

Density. See SOLIDS, Density, Determination of.

Density-Temperature Relation. Density of Liquids and Their Temperature (Die Dichte der Flüssigkeit und deren Temperatur), J. J. Saslawsky. Zeit. für Physikalische Chemie, vol. 109, no. 1-2, Apr. 12, 1924, pp. 111-135. Results of investigation to show connection between density (volume) of liquids and their temperature.

Dielectric Constants, Measurement of. An Electrometer Method for Measuring Dielectric Constants of Liquids, A. P. Carman. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 396-399, 3 figs. Instrument is a form of idiostatic electrometer, or electrostatic voltmeter, part or all of which is immersed in a liquid or liquids.

Distilling, Evaporating and Condensing. Distilling, Concentrating, Evaporating and Condensing Liquids. Abridgments of Specifications (Lond.), Class 32, 1924, Period 1916-20, 152 pp. Patents for inventions.

Evaporation. The Rate of Evaporation of Liquids in a Current of Air, T. B. Hine Physical Rev., vol. 24, no. 1, July 1924, pp. 79-91, 1 fig. Results of experiments show that rate of evaporation is linear function of wind velocity.

Flow of. See FLOW OF LIQUIDS; FLOW OF WATER.

Flowing, Heat Measurement of. See GASES, Flowing, Heat Measurement of.

Fluidity and Temperature, Relation of. A Relation Between the Fluidity and the Temperature of Liquids, H. J. M. Creighton. Nova Scotian Inst. Sci.—Proc. & Trans., vol. 15, part 3-4, Nov. 1923, pp. 165-168. Calculations.

Heat Convection in. See HEAT TRANSMISSION, Problems.

Heat of Evaporation. Apparatus for the Determination of the Heat of Evaporation of Liquids of High Boiling Points, J. H. Awbery and E. Griffiths. Physical Soc. of Lond.—Proc., vol. 36, part 4, June 15, 1924, pp. 303-312, 2 figs. Discusses two new forms of apparatus and their relative merits, tested by determining with them heats of evaporation of alcohol, water, and analine.

Heat Transfer. Heat Transfer vs. Agitation, D. E. Pierce and P. B. Terry. Chem. & Met. Eng., vol. 30, no. 22, June 2, 1924, pp. 872-873, 3 figs. Discusses use of agitation as means of increase of heating or cooling in places where it is difficult to provide more transfer surface.

Inflammable, Storage of. The Storage of Inflammable Liquids (Zur Frage der Lagerung feuergefährlicher Flüssigkeiten), A. Neuburger. Chemiker-Zeitung, vol. 48, no. 53, May 1, 1924, pp. 277-278. Describes Schilde-Eickemeyer system for storage of different kinds of inflammable liquids, including two kinds of pumping apparatus manufactured by firm of Benno Schilde, Berlin.

Mixing Apparatus. Mixing Apparatus for Liquids and Solids (Les appareils mélangeurs), R. Moritz. Chimie & Industrie, special no., May 1924, pp. 135-138, 13 figs. Most efficient apparatus for mixing liquids consists of rotor as used in centrifugal pumps combined with means for converting rotary motion into rectilinear; in nitrators and sulphonators liquid leaving rotor may be made to pass through several staggered rows of vertical rods; recommendations for carbonators, chlorinators, and sulphiting apparatus.

Molecular Association. The Molecular Association of Liquids and Highly Compressed Gases, E. E. Walker. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 279, Mar. 1924, pp. 513-525, 2 figs. Molecular association of liquids; modified law of corresponding states is proposed, which indicates that only substances, molecules of which have same length, are truly corresponding substances.

Specific-Gravity Tables. See VAPORS, Pressure.

Specific Heats. See SPECIFIC HEAT, Liquid and Its Vapor; Organic Liquids.

Sprayed, Measurement of Drops. Measurement of Size of Drops in Sprayed Liquids (Die Messung der Tropfengrösse bei zerstäubten Flüssigkeiten), F. Häusser and G. M. Strobl. Zeit. für technische Physik, vol. 5, no. 4, 1924, pp. 154-157, 4 figs. Method developed by authors, in order to determine efficiency of spray and spraying devices.

Superheating of. The Superheating of Liquids, F. B. Kenrick. Jl. Physical Chem., vol. 28, no. 12, Dec. 1924, pp. 1297-1307, 2 figs. Details of investigation made to obtain definite information concerning extent to which superheating of a given liquid can be carried and length of time for which a liquid may be kept superheated at a given temperature.

Surface Energy. Surface Tension, Surface Energy, and the Surface Layer, A. M. Williams. Manchester Literary & Philosophical Soc.—Memoirs & Proc., vol. 68, no. 1, 1924, pp. 1-12, 2 figs. Attention is drawn to addition to usual expression for surface energy of liquid, arising from possible change of volume in passing from liquid phase to surface layer; this correction probably becomes important only at temperatures near critical; thermodynamical inequalities are deduced.

Thermal Conductivity. Convective Cooling in Liquids—Some Thermal Conductivity Data, A. H. Davis. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 281, May 1924, pp. 972-975. Direct determinations of thermal conductivity at various temperatures, to supplement information previously given.

See also HEAT TRANSMISSION, Thermal Conductivity Values.

Vaporization at High Pressures. Estimation of Latent Heats of Vaporization of Liquids at High Pressures, W. H. McAdams and J. C. Morrell. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 375-378. With latent heats of vaporization of seven different liquids at pressures ranging from 0.006 to 45 atmos. as basis, range of Hildebrand function has been greatly extended; recommends new method of plotting such data, thus rendering extrapolation to high pressures less liable to error; outlines Lewis' method of estimating approximate molecular weight of mixtures of hydrocarbons.

Viscosity. Viscosities of Liquids Experimentally Correlated to Pendulum Dampings, E. H. Barton and H. M. Browning. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 279, Mar. 1924, pp. 495-500, 2 figs. Results of experiments showing relations holding between viscosity and damping.

See also VISCOSITY, Liquids.

Viscous, Motion of. An Apparatus for Investigating Certain Types of Fluid Motion, E. N. da C. Andrade and J. W. Lewis. Sci. Instruments—Jl., vol. 1, no. 12, Sept. 1924, pp. 373-377, 3 figs. Designed to exhibit types of motion of viscous liquid between two rotating cylinders.

LITHOGRAPHING

Steel Sheets and Tin Plate. Lithographing 72,000 Sheets Daily. Iron Trade Rev., vol. 74, no. 12, Mar. 20, 1924, pp. 789-795, 9 figs. Describes process of lithographing; methods and equipment of Wheeling Steel Corpn. which operates a lithographing department for decorating steel sheets and tin plate.

LITHOPONE.

See PIGMENTS, Lithopone.

LOADING MACHINES.

See COAL HANDLING, Loading Machines.

LOCK NUTS

Klimax. The Klimax Nut (Klimax-Muttern), P. E. Perman. Teknisk Tidskrift, vol. 54, no. 8, Aug. 16, 1924, pp. 90-95, 20 figs. (Mekanik). Discusses locknut consisting of two nuts, bearing against each other along slightly inclined plane surface; relative movement between two nuts will bend bolt slightly and form effective lock.

LOCKS

[See also RIVERS, Trent, England.]

Canal. See CANALS, Locks.

Canal Gate. New Type of Canal Lock Gate Developed in Sweden, L. Lawski. Eng. News-Rec., vol 93, no. 4, July 24, 1924, pp. 135-136, 3 figs. Describes floating sector type canal gate developed to meet peculiar conditions which exist in Sodertalje Canal, at Sodertalje, near Stockholm, a tidal canal where difference in head is small. Filling water admitted around gates.

Germany. Poured Concrete Process Used in Building Double Lock at Geestemünde and Experiences With Poured Concrete (Das Gussbetonverfahren beim Bau der Doppelschleuse in Geestemünde und die Erfahrungen mit Gussbeton), Arp and Gaye. Zentralblatt der Bauverwaltung, vol. 44, nos. 38, 40, and 41, Sept. 17, Oct. 1, and 8, 1924, pp. 319-324, 339-343, and 349-353, 27 figs. Locks provide connection between Weser river and fishing port. Details of concrete work, arrangement of towers for pouring, process of concreting, structure of concrete, waterproof quality of concrete, temperature of setting, testing, etc.

Lock Chain Fenders. The Panama Canal Lock Chain Fenders, R. Z. Kirkpatrick. Military Engr., vol. 16, no. 85, Jan.-Feb. 1924, pp. 61-62, 3 figs. Description of chain fenders, and results of field experiments.

Remote Control of Valves and Gates. The Remote Operation of Valves and Gates, R. H. Rogers. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 729-735, 16 figs. Deals with service of electricity in remote operation of valves and gates; remote control of valves and gates at locks of New York State Barge Canal; factors to be considered in design of equipment.

Sea. The New Baltic Sea Locks of the Kaiser-Wilhelm Canal (Die neuen Ostseeschleusen des

Kaiser-Wilhelm-Kanals, Rogge, Preugel, Schinkel, Linnemann and Klatt. Zeit. für Bauwesen, vol. 73, nos. 7-9 and 10-12, 1923, pp. 187-211 and 266-292, 81 figs., partly on supp. plates. Preliminary work; design of lock; construction materials; construction of earthwork and masonry work; lock entrances; sliding gates, their design and equipment; machinery of locks, including mechanical and electrical parts; sluices and their drive; spillways and their drive; central control and command; lock lighting; cable network; power plant; buildings.

Water Flow. Flow of Water in Operation of Chamber Locks (Die Wasserbewegung beim Betriebe von Kammerschleusen), B. Schumacher. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 31, Aug. 2, 1924, pp. 803-808, 8 figs. Mathematical discussion of flow of water from higher level and to low level.

LOCOMOTIVE BOILERS

Boiler-Sheet Flanging Machine. Cold Flanging of Locomotive Boiler Sheets. Boiler Maker, vol. 24, no. 8, Aug. 1924, pp. 232-233, 9 figs. Outline of work of pneumatic flanging machine developed to speed up sheet-metal production.

Broton. Broton Boiler Applied to Hungarian Locomotives. Boiler Maker, vol. 23, no. 11, Nov. 1924, pp. 309-312, 4 figs. Describes Mallet locomotive of Hungarian State Rys., designed to handle traffic on Fiume-Moravica section of Budapest-Fiume line, and of Broton boiler employed, a combined water and firetube boiler, adopted because of successful operation in bad water districts.

Design. Calculation and Construction of a Locomotive Boiler (Berechnung und Konstruktion eines Lokomotivkessels), E. Herms. Praktische Maschinen-Konstrukteur, vol. 57, nos. 21, 22, and 23, June 10, 17, and 24, 1924, pp. 285-290, 301-305, and 324-326, 26 figs. Complete calculation of locomotive boiler with heating surface of 68.4 sq. m.

Locomotive Boilers, H. Fowler and S. J. Symes. Ry. Engr., vol. 45, nos. 530, 531, 532, 534, 536, and 539, Mar., Apr., May, July, Sept., and Dec., pp. 81-85, 117-123, 179-183, 237-240, 301-305 and 427-431, 45 figs. Study of conditions which govern design, construction and operation of boilers as applied to railway locomotives, and influences which affect size and power of modern railway engines.

Locomotive Type Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, p. 27, 1 fig. Losses due to air leakage and radiation reduced to minimum.

Developments. Locomotive Boilers (Notes sur la Chaudière Locomotive), M. Démoulin. Génie Civil, vol. 85, nos. 2 and 3, July 12 and 19, 1924, pp. 34-36, and 59-62, 5 figs. Discusses continued improvements in locomotive operation, boiler developments, variation of power, induced draft, long-distance running, increase in boiler tubes, etc. Process of combustion, feeding fuel, Penn. Ry. tests, conclusions.

Dome Flanging. Flanging Locomotive Boiler Domes in One Piece. Boiler Maker, vol. 24, no. 2, Feb. 1924, pp. 31-36, 4 figs. Practice of Am. Locomotive Co., Schenectady, N. Y.; flanging throat sheets.

Explosions. See BOILER EXPLOSIONS, Locomotives.

Feedwater, Treatment of. See WATER TREATMENT, Railways.

Fireboxes. Autogenous Welding in Case of Damage to Copper Locomotive Fireboxes (Die autogene Schweissung von Schäden an kupfernen Lokomotivfeuerbüchsen), M. Bothe. Technische Blätter, vol. 14, no. 29, July 19, 1924, pp. 220-221, 6 figs. Discusses welding work on steam locomotives and gives examples.

Four-Sheet Fireboxes for Mallet Locomotives. Ry. Rev., vol. 75, no. 5, Aug. 2, 1924, pp. 161-165, 9 figs. Describes firebox construction on Norfolk & Western Ry.; seven-sheet firebox construction reduced to four by use of unusually large boiler plates.

Making Four-piece Mallet Fireboxes, J. A. Doarnberger. Boiler Maker, vol. 24, no. 4, Apr. 1924, pp. 101-104, 9 figs. Methods used in construction of fireboxes for 2-6-6-2 heavy Mallet locomotives for freight service on Norfolk & Western Lines.

Saving Time in Laying Out Locomotive Boilers, C. A. Chincholl. Boiler Maker, vol. 24, no. 7, July 1924, pp. 196-197, 4 figs. Simplified methods of developing wrapper sheets and heads for narrow and wide type locomotive fireboxes.

Flue Holes and Patches. Flue Holes and Patches, T. P. Tulin. Boiler Maker, vol. 24, no. 5, May 1924, pp. 134-135, 6 figs. Methods of installing flue "blinders" with welding process and flue-sheet patches.

Fusible Plugs. Fusible Plugs for Locomotive and Stationary Boilers. Boiler Maker, vol. 24, no. 8, Aug. 1924, pp. 226-227, 8 figs. Discusses various design fusible plugs developed to prevent low water explosions.

Grates. Dump Grates for the German State Locomotives (Zur Frage des Kipprostes der Reichsbahn-Lokomotiven), Nordmann. Glasers Annalen, vol. 95, no. 9, Nov. 1, 1924, pp. 213-217. A criticism of article by Weinnoldt, showing that German Railway Department has smoke-control question well in hand without adoption of dump grates.

Inspection. Suggestions for Inspecting New Locomotive Boilers, G. L. Price. Boiler Maker, vol. 23, no. 16, Oct. 1924, pp. 279-281. Methods of inspection that have proved satisfactory to author.

Laying Out. Saving Time in Laying Out Locomotive Boilers, C. A. Chincholl. Boiler Maker, vol. 24, no. 8, Aug. 1924, pp. 234-235, 5 figs. Short cuts used in laying out regular and irregular cones and gusset sheets for boiler repair work.

Manufacture. Building Locomotive Boilers. Eng. Production, vol. 7, no. 139, Apr. 1924, pp. 105-110, 16 figs. Procedure at works of Great Western Ry. Co. at Swindon, Eng.

Shop Kinks for Locomotive Boiler Work. Boiler Maker, vol. 23, no. 16, Oct. 1924, pp. 282-284, 12 figs. Time and labor saving devices and shop methods developed by practical boiler makers.

Paying Weight. The Paying Weight in Locomotive Boilers, C. A. Seley. Ry. Age, vol. 76, no. 24, May 17, 1924, pp. 1216-1218, 1 fig. Firebox heating surface about twice as effective as tubes and flues per lb. of material.

Performance. Locomotive Boiler Performance, E. C. Poultney. Engineer, vol. 137, nos. 3556 and 3557, Feb. 22 and 29, 1924, pp. 192-195 and 218-221, 15 figs. Information on performance of locomotive boilers differing in proportions of their related parts when operating at various rates of power output, based upon tests made by Pennsylvania System on locomotive testing plant at Altoona, Pa.

Pulverized-Coal-Fired. Pulverized-Coal Firing for Locomotives (Die Brennstaubfeuerung für Lokomotiven), Dannecker. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 13, Oct. 15, 1924, pp. 296-300, 5 figs. Discusses treatment of coal, including crushing, drying and pulverizing, furnaces and burners, advantages, etc.

Repair Shop. A Modern Locomotive Boiler Reconditioning Shop, Alsace-Lorraine Railway, J. T. Burton-Alexander. Engineer, vol. 137, no. 3564, Apr. 18, 1924, pp. 404-407, 13 figs., partly on p. 414. Details of boiler shop erected since war at Strasburg; installation for repair of tubes.

Repairing. Repairing Locomotive Boilers at Bischheim, France. Boiler Maker, vol. 24, nos. 6 and 7, June and July 1924, pp. 157-160 and 198-200 and 219, 10 figs. Special equipment developed at new Alsace and Lorraine Railways' boiler shop to speed up production, including equipment for erecting and testing locomotive boilers and for flue reclaiming. Translated from Revue Générale des Chemins de Fer et des Tramways.

Side Lights on Boiler Work at Glenwood Shops. Boiler Maker, vol. 24, no. 7, July 1924, pp. 191-194, 10 figs. Special shop-made equipment aids in repairing many different classes of locomotives coming to Glenwood shops, Baltimore & Ohio Ry.

Using Compressed-Air Tools in Locomotive-Boiler Repairs (Die Verwendung von Pressluftwerkzeugen in der Eisenbahn-Lokomotivkessel-Reparatur), E. Pallas. Maschinenbau, vol. 3, no. 23, Sept. 11, 1924, pp. 859-863, 9 figs. Describes most recent pneumatic tools and their construction, and application in removing boiler tubes and rivets, repairing tubes, thread cutting, etc.

Siphons. Applying the Thermic Syphon to Locomotive Boilers. Boiler Maker, vol. 23, no. 11, Nov. 1924, pp. 313-315 (including discussion), 3 figs. Abstract of report read before Master Boiler Makers' Assn., dealing with effect of siphons on life of firebox sheets and flues.

Increasing Locomotive Boiler Efficiency and Capacity by Installing Nicholson Thermic Syphons for Circulation and Heating Surface, C. A. Seley. Assn. Chinese & Am. Engrs.—Jl., vol. 5, no. 6, June 1924, pp. 9-12, 9 figs. Describes Nicholson thermic siphon and its operation in action circulation of boiler water.

Staybolts. Oversize Staybolts for Locomotive Boilers (Im Gewinde dichte Stehbolzen). Glasers Annalen, vol. 94, nos. 9, 10, and 11, May 1, 15, and June 1, 1924, pp. 113-118, 123-129, and (discussion) 139-147, 37 figs. Different methods of expanding bolts in locomotive boilers so as to secure tight joints.

LOCOMOTIVES

Accidents. Annual Report of Bureau of Locomotive Inspection, A. G. Pack. Ry. Rev., vol. 75, no. 24, Dec. 13, 1924, pp. 952-955, 1 fig. Shows improvement in condition of locomotives and decrease in number of accidents; suggestions relative to means for preventing recurrence of number of more common causes of locomotive failures and accidents. (Abstract.)

See also ACCIDENTS, Locomotive.

Adhesion and Rack. A Modern Rack Locomotive. Ry. Gaz., vol. 40, no. 6, Feb. 8, 1924, p. 174, 1 fig. Principal data for recent type of 4-cylinder, 2-8-2 type, combined rack and adhesion locomotive, built for German State Rys. for operation on Abt system.

Algerian State Railways. New Locomotives for the Algerian State Railways. Ry. Gaz., vol. 41, no. 1, July 4, 1924, pp. 13-15, 6 figs. 4-8-2 "Mountain" type locomotives designed and built by Schneider & Co., designed to haul trains of 300 tons on gradients of 1 in 70 and 1 in 80 at 31 m.p.h.; for heavy service in passenger and freight traffic.

Alloy Steels for. See ALLOY STEELS, Locomotive Parts.

Articulated. See Garratt; Mallet.

Axle Boxes, Lubrication of. Reduction of the Cost of Traction: Lubrication of Axleboxes for all Rolling Stock, G. H. Emerson. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 1055-1090, 6 figs. Consideration of question as it applies to conditions and practices effective on American railways and particularly railways of Canada and United States.

Axle-Repair Machines. Machines for Repairing Journals, Cranks and Fly Cranks of Locomotive Axles (Appareils pour rectifier les fusées, tourillons et contre-manivelles des essieux de locomotives), M. Montillier. Génie Civil, vol. 84, no. 12, Mar. 12, 1924, pp. 279-280, 5 figs. Describes portable lathe for repairing axle cranks and journals which can be placed directly under axle, and machine for repairing fly cranks.

Axles, Calculation of. Practical Graphico-Analytic Method for Calculating Locomotive Axles (Metodo pratico grafico-analitico per il calcolo degli assi delle locomotive), N. Fabiano. Industria, vol. 38, nos. 17, 18 and 20, Sept. 15, 30, and Oct. 31, 1924, pp. 466-474, 498-501, and 554-563, 37 figs. Calculation of different types of axles, and numerical examples.

Baldwin. Baldwin Locomotives for the Madras & Southern Mahratta Railway. Ry. Gaz., vol. 41, no. 10, Sept. 5, 1924, p. 314, 2 figs. Describes 4-6-2 and 2-8-2 type locomotives built by Baldwin Locomotive Co. for Madras & Southern Mahratta Ry.; "Pacific" and "Mikado" type engines are built to large proportions for working heavy express passenger and freight trains on 5-ft. 6-in. gage.

Baltic Type. See Tank.

Bearings. See BEARINGS, Locomotive.

Behavior of Wheels on Track. Behaviour and Movement of Locomotive Wheels on the Track, J. Buchli. Int. Ry. Congress Assn.—Bul., vol. 6, no. 6, June 1924, pp. 417-437, 30 figs. Trials carried out on model which reproduced conditions encountered in practice as accurately as possible with object of ascertaining lateral adhesion of wheel on rail under most widely different service conditions. Translated from Schweizerische Bauzeitung.

Boilers. See LOCOMOTIVE BOILERS.

Bombay, Baroda & Central India Ry. New Express and Freight Locomotives, Bombay, Baroda & Central India Railway. Ry. Engr., vol. 45, no. 532, May 1924, pp. 170 and 178. Particulars of 4-6-2-type express passenger and 2-8-2-type freight locomotives; tractive force at 90 per cent of boiler pressure, 28,823 lb.

Boosters. Locomotive Boosters and Their Effect on Locomotive Design and Train Operation. Ry. & Locomotive Eng., vol. 37, no. 10, Oct. 1924, pp. 299-300. Consideration of limitations and functions; what booster is capable of doing in passenger and freight service. Committee report before Traveling Engrs.' Assn.

The Locomotive Booster, M. H. Roberts. Ry. & Locomotive Eng., vol. 37, no. 4, Apr. 1924, pp. 111-115, 6 figs. Effect of locomotive booster on operation and its efficiency as engine.

British. British Locomotives in 1923, J. F. Gairns. Int. Ry. Congress Assn.—Bul., vol. 6, no. 2, Feb. 1924, pp. 121-137, 8 figs. Designs and work.

British Empire Exhibition. British Empire Exhibition; Railway Material. Engineering, vol. 171, no. 3047, May 23, 1924, pp. 665-668 and 672, 19 figs. Details of 4-6-0 locomotive for Lond. Midland & Scottish Ry.; narrow-gage gasoline locomotive, constructed by Drewry Car Co.; Drewry standard car, and light-inspection "Alpha" trolley; electric battery-shunting locomotive, built by Hawthorn, Leslie Co.

Locomotive Development, J. H. Brittain. Engineer, vol. 137, no. 3568, May 16, 1924, pp. 528-531, 9 figs., partly on supp. plate. Description and comparison of Lond. & North-Eastern Ry. (Great Northern) 3-cylinder locomotive, Flying Scotsman, Great Western 4-cylinder locomotive, Caerphilly Castle, both exhibited at Brit. Empire Exhibition, and Vincent Raven's 3-cylinder Pacific, not exhibited.

Railway Material Exhibited at British Empire Exhibition. Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 535-541, 18 figs., partly on supp. plates. Exhibits of locomotives and cars.

Cabs, Temperatures in. Temperatures in Cabs of Freight Locomotives Passing Through Tunnels of the Chesapeake & Ohio Railroad, S. B. Katz and E. G. Meiter. U. S. Bur Mines—Reports of Investigations, no. 2624, July 1924, 8 pp., 6 figs. and 3 tables on supp. plates. See also Ry. & Locomotive Eng., vol. 37, no. 9, Sept. 1924, pp. 264-268, 3 figs. Investigation of composition of atmospheres in cabs while in tunnels; test results; protection from smoke and irritating gases by means of pocket-size gas respirators.

Castings for. See IRON CASTINGS, Locomotive.

China, Types Used in. Locomotive Practice on the Chinese Government Railways. Ry. Engr., vol. 45, no. 529, Feb. 1924, pp. 66-69, 9 figs. Data on locomotives used on the different railways; a multiplicity of types of international origin are in use, but efforts toward standardization are being pursued.

Coaling Plants. Locomotive Coaling Installation at Nine Elms, Geo. F. Zimmer. Engineer, vol. 138, no. 3590, Oct. 17, 1924, pp. 442-444, 4 figs. Installation with overhead bunkers, installed by Mitchell Conveyor & Transporter Co. for Southern Ry. Co.

Recent Plants for Coaling Locomotives (Einige neuzeitliche Lokomotiv-Bekohlungsanlagen), B. Garlepp. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 890-894, 10 figs. Describes cranes, movable bunkers, etc., for stations of a daily capacity of up to 300-400 tons coal: track arrangement, coal stacks, etc.

See also COAL HANDLING, Locomotive Plants.

Compound. Compound Locomotives. Times Trade & Eng. Supp., vol. 14, no. 297, Mar. 15, 1924, p. 23. Discusses their reintroduction on British railways, giving data on different types.

1 E Superheater Two-Cylinder Compound Locomotive of the Austrian Federal Railway (1 E-Heissdampf-Zweizylinder-Verbundlokomotive der österreichischen Bundesbahnen), J. Rihosek. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 1, Jan. 15, 1924, pp. 8-11, 1 fig. Construction and characteristics of new freight locomotives.

See also High-Pressure Boiler.

Compound vs. Simple. Compound vs. Simple Locomotives in France, M. Vallantine. Ry. Age, vol. 76, no. 8, Feb. 23, 1924, pp. 461-462. Tests of Pacific locomotives in express service on P. L. & M. and Paris-Orleans show economy of compounds.

Condensing. Paris-Orleans Condensing Locomotive, H. Lefiot. Ry. Mech. Engr., vol. 98, no. 4, Apr. 1924, pp. 211-212, 3 figs. Means adopted on suburban tank locomotive for condensing exhaust steam while passing through long tunnel.

Reciprocating Steam Locomotives With Condensation (Die Kolbendampfmaschinen-Lokomotive mit Kondensation), K. Pfaff. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 30, Sept. 20, 1924, pp. 997-1003, 18 figs. Discusses effect of condensation by means of diagrams and shows that a superheated-steam condensing locomotive does about double the work of a saturated-steam locomotive of same heating surface, i.e., same fuel consumption.

Connecting Rods. See CONNECTING RODS, Locomotive, Repair of.

Consolidation. Consolidation Type Locomotives for the Reading Company. Ry. & Locomotive Eng., vol. 37, no. 6, June 1924, pp. 179-180, 1 fig. Heavy consolidation 2-8-0 type built by Baldwin Locomotive Works; boiler is of Wootten type.

Heavy Freight Locomotives for the Reading. Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 581-583, 2 figs. Describes Consolidation type locomotive, weighing 314,950 lb., and having tractive effort of 71,000 lb.; 2-8-0 wheel arrangement.

New 2-8-2 Type Heavy Goods Engine, Imperial Japanese Railways. Ry. Gaz., vol. 41, no. 4, July 25, 1924, p. 120, 2 figs. Engine for working heavy freight trains built by Kawasaki Dockyard & Eng. Co. at their Hiogo Works, Kobe; piston stroke, 26 in.; total engine wheelbase, 31 ft. 6 in.; steam pressure, 180 lb. per sq. in.

New 2-8-2 Type Locomotives for the Sudan Government Railways. Ry. Gaz., vol. 40, no. 6, Feb. 8, 1924, p. 173, 1 fig. Principal data of locomotives being introduced for working on Kassala line extension; for 3-ft. 6-in. gage; tractive force at 85 per cent boiler pressure 26,000 lb.

New 3-Cylinder, 2-8-2 Type Locomotive, German State Railways. Ry. Gaz., vol. 40, no. 5, Feb. 1, 1924, p. 143, 1 fig. Principal dimensions and data of locomotives designed for working express passenger and heavy freight traffic; working pressure 200 lb. per sq. in.

Reading Company Consolidation Locomotives. Ry. Rev., vol. 75, no. 2, July 12, 1924, pp. 43-46, 3 figs. Particulars of new eight-coupled 2-8-0 locomotives placed in service by Phila. & Reading Ry. for handling coal trains. Tractive effort 71,000 lb.

Reading Consolidation Type Locomotive. Ry. Age, vol. 77, no. 1, July 5, 1924, pp. 19-20, 1 fig. Weighs 314,950 lb., with 284,190 lb. on drivers, and develops a maximum tractive force of 71,000 lb.

Construction. See BOILERMAKING, Locomotive Boilers.

Construction, France. Building Locomotives in France, V. Delport. Iron Trade Rev., vol. 75, no. 10, Sept. 4, 1924, pp. 600-603, 4 figs. Methods used at works of Société Française de Constructions Mécaniques, at Denain.

Crank Axles, Solid. Solid Crank Axles, H. Fowler. Engineer, vol. 138, no. 3597, Dec. 5, 1924, pp. 650-651. Discusses design based on author's experience on Midland Division of Lond. Midland & Southern Ry. (Abstract.) Lecture to Instn. Locomotive Engrs.

Crankpins, Bored. Bored Pins and Axles for Locomotives, L. H. Fry. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 667-668, 1 fig. Claims that increased strength with less weight can be obtained by using larger inside diameters.

Crossheads. Calculating the Strength of Connection of a Piston Rod and a Locomotive Crosshead by Means of Wedging (Festigkeitsrechnungen an der Verbindung einer Kolbenstange mit einem Lokomotivkreuzkopf mittels Keil), Kühn. Praktische Maschinen-Konstrukteur, vol. 57, no. 33, Sept. 2, 1924, pp. 456-457, 8 figs. Gives complete calculation for diameter of cylinder = 350 mm., steam pressure = 10 atmos.

Cylinder Performance. Locomotive Cylinder Performance, E. C. Poultney. Engineer, vol. 138, nos. 3595 and 3596, Nov. 21 and 28, 1924, pp. 574-575 and 602-604, 12 figs. Test results appertaining to engines of Pennsylvania express

locomotives K2sa and E6s. Nov. 28: Cut-off, its relation to throttling; indicator diagrams for superheated and saturated steam; coal and water savings.

Cylinders, Machining. Machining of Locomotive Cylinders and Valve Liners (Bearbeitung von Locomotivzylindern und Kolbenschieberbüchsen), E. Trebi. Werkstattstechnik, vol. 18, no. 18 Sept. 15, 1924, pp. 489-492, 12 figs. Details of drilling and milling machines of various types.

See also CYLINDERS, Locomotive, Machining; Locomotive, Welding; MACHINING METHODS, Locomotive Cylinders.

Daily Performance. Engine Performances in Daily Slow and Fast Freight and in Yard Service, R. S. Parsons and J. F. Jennings. Central Ry. Club—Proc., vol. 32, no. 3, May 1924, pp. 1552-1560 and (discussion) 1560-1575. See also (abstract) in Ry. Rev., vol. 74, no. 20, May 17, 1924, pp. 884-886. Daily program and performance; mechanical features.

Decapod. Decapod Locomotives for Gulf, Mobile and Northern Railroad. Railroad Herald, vol. 28, no. 3, Feb. 1924, pp. 16-17, 1 fig. Dimensions and principal data of locomotive for freight service; tractive force 60,000 lb.; 2-10-0 wheel arrangement.

Decapod Tests Show Well Defined Fuel Economy. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 662-666, 12 figs. Addition of feedwater heater results in 14 per cent coal saving over previous Ils Pennsylvania locomotives.

Decapod Type Locomotive for G. M. & N. R. R. Ry. Rev., vol. 74, no. 8, Feb. 23, 1924, pp. 317-320, 4 figs. See also Ry. & Locomotive Eng., vol. 37, no. 2, Feb. 1924, pp. 35-36, 1 fig. Dimensions and principal data of 2-10-0 type locomotives of Gulf Mobile & Northern R. R. for heavy freight service; 215 lb. boiler pressure; 60,000 lb. tractive force.

Russian "Decapod" Locomotives, A. Lipetz. Ry. Engr., vol. 45, no. 530, Mar. 1924, pp. 104-108, 12 figs. Describes frames and running gear, cab, running-board, jacket, brakes, tools, sandbox, radial buffer connection, tender, etc. (Continued from Aug. 1923 issue, p. 313.)

Tests of Decapod Show 14 Per Cent Fuel Saving. Ry. Age, vol. 77, no. 15, Oct. 11, 1924, pp. 635-638, 12 figs. Abstract of report in Bul. No. 32 (copyright 1924 by Pa. R. R.), giving results of test plant trials; latest Pennsylvania class Ils locomotives show expected economy with short cut-off.

2-10-0 Heavy Freight Locomotive, Polish State Railways. Ry. Gaz., vol. 41, no. 22, Nov. 28, 1924, p. 701, 2 figs. Locomotive built in Germany and shown at Seddin Exhibition.

Derailments on Curves. Derailments of Locomotives on Curves, R. C. Beaver and M. B. Richardson. Ry. Mech. Engr., vol. 98, no. 12, Dec. 1924, pp. 721-725, and vol. 99, no. 1, Jan. 1925, pp. 16-20, 12 figs. Investigation of mechanics of curving to determine why wheels leave rail; result of series of investigations begun in 1919. Jan. 1925: Practical application—factor of wheel bearing is worked out for 2-10-2 type.

Design. Individualism in Locomotive Design, J. G. H. Warren. Engineer, vol. 138, no. 3600, Dec. 26, 1924, pp. 717-719, 3 figs. Consideration of indiscriminate use of standard parts; modifications or additions to "basic" design, which add to weight without proportionate increase to heating surface; includes comparative table showing values of ratio of heating surface to total weight for representative good engines, 1895-1924.

Locomotive Design. Ry. Jl., vol. 30, no. 3, Mar. 1924, pp. 18-19, 45 figs. pp. 19-31. Deals with starting capacity, hauling capacity and general economy in operation. Illustrations of American locomotive types.

Modern Locomotive Engine Design and Construction, Ry. Engr., vol. 45, no. 529, Feb. 1924, pp. 50-53 and 65, 1 fig. Coned helical and volute springs; stresses in locomotive wheels; wheel-boss stresses; stresses in wheel tires.

New Locomotive Construction (Neue Wege im Lokomotivbau), F. Meineke. Zeit. des Vereines Deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, pp. 937-942, 13 fig. Discusses increased pressure and temperature for more economic working, Krupp turbo-locomotives, Diesel locomotives, 1200-hp. Diesel-electric locomotives of Russian State Railways, operating Diesel locomotives with hydrogen, etc.

The Design of Separate Parts of Steam Locomotives (Ueber die Gestaltung der Einzelteile von Dampflokomotiven), K. Ewald. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 12, Mar. 22, 1924, pp. 285-287, 7 figs. Seeks to formulate requisites for esthetic design and to develop rules for form and shape of principal parts.

The Locomotive of To-Day, J. Partington. New England Railroad Club—Proc., Feb. 12, 1924, pp. 245-257 and (discussion) 257-273. Discusses ways in which design must be definitely made to fit physical limitations of roadbed, bridges, tunnels, roundhouses, etc., and important connection between design and maintenance facilities especially as it applies to proper maintenance of appliances and materials now coming into general use. Review of three-cylinder locomotives in general; description of three-cylinder locomotive No. 5000 of Lehigh Valley R. R. and results of test made in Dec. 1923.

Design, Relation to Track Stresses. See RAILWAY TRACK, Stresses in.

Development. A Quarter Century of the Steam Locomotive, W. A. Austin. Ry. Rev., vol. 74, no. 2, Jan. 12, 1924, pp. 107-114, 24 figs. History of growth and development of the various types since introduction of first American Mogul and Atlantic types.

Development of the Modern Locomotive Engine, G. Greenough. St. Louis Ry. Club, vol. 28, no. 9, Jan. 11, 1924, pp. 178-195 and (discussion) 196-204, 6 figs.

Motive Power Development, Pennsylvania Railroad System, P. T. Warner. Baldwin Locomotives, vol. 2, no. 4 and vol. 3, nos. 1 and 2, Apr., July, and Oct. 1924, pp. 3-26, 33-57, and 3-29, 162 figs. Apr.: Development of power up to year 1868, when standard locomotive designs were adopted. July: Covers period 1868 to 1899, in which year Pennsylvania adopted Atlantic type for fast passenger service. Oct.: Development from 1899 to present time.

The Modern Steam Locomotive (Die Dampflokomotive der Gegenwart), Metzeltin. Hanomag-Nachrichten, vol. 11, no. 123, Jan. 1924, 1-7, 4 figs. Describes some of the latest modern high-powered locomotives and points out possibilities of further developments.

The Steam Locomotive; Engineering and Business Considerations, W. H. Winterrowd. Can. Ry. & Mar. Wld., no. 317, July 1924, pp. 322-325, 3 figs. Discusses development steam locomotive has undergone during past 20 years and lines along which future development may be expected.

Diesel and Steam, Performance. Calculating the Performance of Steam and Diesel Locomotives (Leistungsberechnung bei Dampf- und Diesellokomotiven), W. Bauer. Kraftmaschine, vol. 21, nos. 14 and 16, July 25 and Aug. 25, 1924, pp. 141-142 and 167-168. Discusses dependence of performance on drawbar pull, boiler and cylinder in

steam locomotives and number of cylinders, cylinder dimensions and r.p.m. in Diesel locomotives.

Diesel-Compressed Air. Diesel-Compressed Air Locomotive. Times Trade & Eng. Supp., vol. 13, no. 295, Mar. 1, 1924, p. 615. Invention consists in applying compressed air by means of Diesel engine as motive power for railway traction; results of trials on Italian railways.

Diesel-Electric. A Diesel-Electric Locomotive. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 552-554, 5 figs. Results of trials at Esslingen Engine Works, Stuttgart, Germany, where locomotive, designed by Geo. Lomonossoff, was constructed.

A 1,200-h.p. Diesel-Electric Locomotive. Oil Engine Power, vol. 2, no. 10, Oct. 1924, pp. 521-524, 4 figs. Built for Russian Government, new locomotive possesses decisive advantages over its steam competitors for operation in arid and fuelless districts.

An Italian Diesel-Electric Locomotive (Una locomotiva italiana Diesel-elettrica), G. Sona. Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 5, May 15, 1924, pp. 145-158, 9 figs. Details of experiments on Calabro-Lucana line with 440-hp. units constructed by Italian Brown-Boveri and Fiat companies.

Diesel-Electric Locomotive for Tunis Railway (Locomotive Diesel Electrique en Service en Tunisie), R. Debize. Revue Générale des Chemins de Fer & des Tramways, vol. 43, no. 3, Mar. 1924, pp. 172-180, 8 figs. Details of locomotive supplied by Diesel-Elektriska Vagn-Aktiebolaget, Sweden; consists of rigid frame mounted on two trucks, each equipped with two axles; a heavy-oil Diesel engine is mounted on frame which is direct coupled to generator.

Diesel-Electric Locomotive Surpasses Steam on Test, Lomonossoff. Oil Engine Power, vol. 2, no. 12, Dec. 1924, pp. 653-637, 6 figs. In discussing construction and performance of 1200-hp. unit built under his direction for Russian Government, author describes solution found for cooling problems and appends tests made comparatively with equivalent steam locomotive showing how Diesel locomotive wins on every point.

Diesel-Electric Locomotives (Locomotora Diesel Eléctrica), E. V. Moreno. Ingeniería, vol. 28, no. 9, Sept. 1924, pp. 393-386, 3 figs. Design, construction and operation of locotractor built by Diesel-Elektriska Vagn-Aktiebolaget, also advantages.

New Type Electric Locomotive. Area, vol. 12, no. 10, May 1924, pp. 1729-1732, 4 figs. See also Ry. Age, vol. 76, no. 23, May 10, 1924, p. 1159, 2 figs., and Ry. Rev., vol. 74, no. 19, May 20, 1924, pp. 840-847, 3 figs. Describes locomotive using oil for its fuel, built jointly by Gen. Elec. Co. and Ingersoll-Rand Co., and especially designed for switching service; fuel-oil engine operates d.c. generator supplying current to motors without intervening accelerating resistance; fuel cost exceedingly low, and new engine is smokeless.

Oil-Electric Locomotive Comes to New York. Compressed Air Mag., vol. 29, no. 7, July 1924, pp. 923-925, 6 figs. Details of new locomotive with 200-kw. generator directly connected to 300-hp. oil engine for switching service of N. Y. Central; uses low-cost fuel oil.

Oil-Engined Locomotive Proves Its Worth. Oil Engine Power, vol. 2, no. 8, Aug. 1924 pp. 417-419, 3 figs. 24-hr. operation in Manhattan's busy railroad yards proves satisfactory. Characteristics of engine, which has striking method of fuel distribution, supplement uncanny flexibility of electrical transmission.

The American Diesel-Electric Locomotive is Here. Oil Engine Power, vol. 2, no. 5, May 1924, pp. 257-259, 5 figs. 300-b.hp. locomotive constructed by Gen. Elec. and Ingersoll-Rand companies, with 6-cylinder airless-injection 4-cycle type Ingersoll-Rand oil engine directly connected to 200-kw. Gen. Elec. generator.

Diesel-Engined. German Diesel Locomotives, F. Meineke. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 167-170, 8 figs. States that several locomotives with Diesel engines are being built in Germany, representing very remarkable solutions of problem; describes different types.

Tests of a 60-H.P. Diesel Locomotive on the London & North Eastern Railway. Ry. Gaz., vol. 41, no. 6, Aug. 8, 1924, pp. 178-180 and 193, 6 figs. Describes locomotive which is of Austrian manufacture, 0-4-0 type, and equipped with 60-hp. six-cylinder Diesel engine, which transmits its power through Lentz hydraulic transmission mechanism.

Tests of a 60-Hp. Graz Diesel-Engine Locomotive With Hydraulic Lentz Reduction Gear (Gutachten über die Probefahrten mit einer 60 PSe normalspurigen Grazer Dieselmotor-Lokomotive mit hydraulischem Lentzgetriebe). Glasers Annalen, vol. 95, no. 6, Sept. 15, 1924, pp. 148-154, 4 figs. All principal technical data and test results are given in detail. Tests were made by Austrian Nat. Rys. and were highly satisfactory.

The Graz Diesel Locomotive With Hydraulic Lentz Reduction Gears (Die Grazer Diesellokomotive mit hydraulischem Lentzgetriebe). Wirtschaftsmotor, vol. 6, no. 9, Sept. 25, 1924, pp. 1-5, 7 figs. Explains principle of Lentz hydraulic reducing gear, which permits of variation of speed of driven axle at constant speed of driving axle, and describes a locomotive embodying said principle.

The Next Step is the "Thermo-Locomotive," J. Barraja-Frauenfelder. Ry. Mech. Engr., vol. 98, no. 2, Feb. 1924, pp. 81-85, 1 fig. Application of Diesel engine to railway work; the Sulzer thermo-locomotive.

The Theory of the Diesel Locomotive (Zur Theorie der Diesellokomotive), G. Lomonossoff. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 9, Mar. 1, 1924, pp. 198-202, 3 figs. Whereas in steam locomotives tractive effort is limited by adhesive weight, cylinders and boiler, with Diesel locomotives transmission ratio takes place of cylinder between engine and driving wheels, and efficiency of engine takes place of boiler; influence of these values is discussed and formulas therefor derived.

See also Internal-Combustion; Switching.

Dimensions Comparison. The Comparison of Locomotive Dimensions, E. C. Poultney. Ry. Engr., vol. 45, no. 528, Jan. 1924, pp. 19-21 and 35. Discusses factors which it is necessary to consider when a general opinion is to be formed as to comparative capacity of any given locomotive. Locomotive power definitions.

Drafting Conditions, Control of. Exhaust Nozzle and Front End Adjustment, D. L. Derrom. Ry. Mech. Engr., vol. 98, no. 6, June 1924, pp. 362-365, 2 figs. Outlines effective means of controlling changes in drafting conditions.

Driving Boxes. Handling Driving Box Work, J. H. Hahn. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 549-552, 10 figs. Proper layout of machine tools and use of special fixtures speeds up production.

Machining Driving Boxes, Shoes and Wedges. Ry. Rev., vol. 74, no. 23, June 7, 1924, pp. 1029-1039, 25 figs. Variations in design necessitate use of different practices in finishing these parts in railway machine shop.

Replacement Driving Boxes on the New York Central, L. C. Morrow. Am. Mach., vol. 61, no. 8, Aug. 21, 1924, pp. 309-312, 12 figs. Practice

of West Albany shops. Operations on driving boxes, crown brasses, shoes, and wedges.

The American Locomotive Company's Methods of Machining Driving Boxes, L. C. Morrow. Am. Mach., vol. 61, no. 19, Nov. 6, 1924, pp. 715-717, 10 figs. Details of all machining operations; machine equipment employed; methods of locating, supporting and clamping work; cutters; figures of output per 9-hr. day.

Dynamics. Dynamics of Steam Locomotives (Zur Dynamik der Dampflokomotiven), A. Closterhalfen. Hanomag-Nachrichten, vol. 11, no. 124-125, Feb.-Mar. 1924, pp. 13-48, 35 figs. Development of steam engine after Watt; movement of locomotives, including vertical, rocking, rolling, recoiling, turning, and hunting; dynamic aspects and mathematical treatment.

Electric. See ELECTRIC LOCOMOTIVES.

Electric Lighting. Report of Committee on Locomotive Electric Lighting. Ry. Elec. Engr., vol. 15, no. 10, Oct. 1924, pp. 336-337. Summary of various protective steps suggested to eliminate injury from electric circuits. Committee report before Assn. Ry. Elec. Engrs.

Enginehouses. See ENGINEHOUSES.

Erection. An Improved Method of Locomotive Erection By the Use of Erecting Forms, S. R. Limerick. Baldwin Locomotives, vol. 3, no. 1, July 1924, pp. 28-32, 8 figs. Describes mechanical erector, developed by Baldwin Locomotive Wks., a device for absolute control of work of erecting a locomotive, eliminating all possibility of errors in alignment, inequalities of measurement and all variances formerly existent in locomotives incidental to exercise of personal judgment or skill on part of workmen. Erection of locomotive by this method.

Erecting Locomotives on Special Forms, F. C. Hudson. Am. Mach., vol. 61, no. 17, Oct. 23, 1924, pp. 641-642, 5 figs. Methods used by Baldwin Locomotive Works for alignment of frames and other parts; miscellaneous jacks and temporary blocking formerly used have been eliminated.

Erection Methods in Locomotive Building, F. H. Ryan. Can. Machy., vol. 32, no. 26, Dec. 25, 1924, pp. 150-154, 8 figs. System of production in use in Kingston plant of Can. Locomotive Co. carried out in well-ordered plan of sequences.

Feedwater Heaters. See FEEDWATER HEATERS, Locomotives.

Feedwater Treatment. Union Pacific Water Work Proves Profitable. Ry. Age, vol. 77, no. 14, Oct. 4, 1924, pp. 585-592, 7 figs. Particulars of water improvement work undertaken. New treating plants built; anti-foaming compound supplements softeners; saving from softeners exceeds $200,000 annually.

Water Treatment on the Chicago & Alton R. R., L. O. Gunderson. Ry. Rev., vol. 75, no. 16, Oct. 18, 1924, pp. 571-575, 3 figs. Results of systematic soda-ash treatment for locomotive-boiler waters of exceptionally undesirable quality.

Fireboxes, Welding. See OXY-ACETYLENE WELDING, Locomotive Fireboxes.

Fireless. Project of a Fireless Locomotive (Entwurf einer feuerlosen Lokomotive), E. Herms. Fördertechnik u. Frachtverkehr, vol. 17, no. 18, Sept. 18, 1924, pp. 246-249, 1 fig. Heat, stored in boiler, is used to produce steam required to propel engine. Description and calculations.

35-Ton Fireless Locomotives (B-feuerlose Lokomotive von 35.5 t Dienstgewicht für Regelspur), Metzeltin. Hanomag-Nachrichten, vol. 11, no. 131, Sept. 1924, pp. 150-151, 3 figs. Describes locomotive provided with starting steam tank of comparatively small dimensions filled simultaneously with main tank but independent thereof; main and auxiliary valves are so arranged that they close automatically as soon as driver releases lever governing them.

Flange Oiler. See LUBRICATION, Locomotive Wheel Flanges.

Four-Cylinder. New Four-Cylinder "Baltic" Tank Engines, London Midland & Scottish Railway. Ry. Engr., vol. 45, no. 533, June 1924, pp. 207-209, 5 figs. Details of 4-6-4-type locomotive, ten of which are being introduced for working suburban passenger and shorter-distance residential main-line traffic.

See also British Empire Exhibition; Tank.

Freight. I D Superheated Freight Locomotives for Servia (I D-Heissdampf-Güterzug-Lokomotiven für Serbien), W. Franke. Glasers Annalen, vol. 95, no. 4, Aug. 15, 1924, pp. 51-56, 12 figs. Design, construction and equipment of locomotives built by Linke-Hofmann Works, capable of pulling train of 420 tons at 35 km. per hr.

1 E Large Freight Locomotives of the Austrian Federal Railway (1 E-Grossgüterzuglokomotiven der österreichischen Bundesbahnen), J. Rihosek. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 225-232, 26 figs. Results of preliminary tests of coal-saving equipment; new designs of 1 E locomotives, series 81; details of Dabeg spray preheater; exhaust-gas preheater; Davis and Metcalfe exhaust-steam injector; Lentz valve gear; etc.

French Railways. New Locomotives for French Railways. Ry. Gaz., vol. 40, no. 26, June 27, 1924, pp. 923-925, 5 figs. Describes new 4-6-2 type four-cylinder engine for Calais-Paris express passenger service of Northern Ry. and 2-8-2 type tank engine equipped with condensing apparatus for Paris-Orleans Ry.

Fuel Economy. Suggestions on Locomotive Fuel Economy, D. L. Franciscus. Ry. Rev., vol. 74, no. 7, Feb. 16, 1924, pp. 286-288. Abstract of prize-winning paper in Int. Ry. Fuel Assn. contest.

See also FUEL ECONOMY, Railways.

Fuels. Reduction of the Cost of Traction: Fuel and Its Combustion, G. H. Emerson. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 1029-1054. Consideration of question as it applies to conditions and practices effective on American railways and particularly railways of United States. Discusses choice of locomotive fuel and gives particulars regarding the different fuels that are employed; apparatus for combustion of fuels.

Garratt. A Noteworthy Garratt Locomotive Development. Ry. Engr., vol. 45, no. 538, Nov. 1924, pp. 377-379, 5 figs. Engine is first built on Garratt principle to have 8 coupled wheels; claimed to be largest locomotive yet constructed for working on meter-gage lines.

Garratt Articulated Locomotives. Times Trade & Eng. Supp., vol. 14, no. 304, May 3, 1924, p. 191, 1 fig. Fundamental principle governing design is provision of engine combining great flexibility with comparatively high power, and affording possibility of large boiler dimensions; first of its kind to be used in England recently delivered by Beyer, Peacock & Co.

Garratt Locomotive in India and South Africa. Ry. Rev., vol. 74, no. 10, Mar. 8, 1924, pp. 447-449, 3 figs. Describes locomotives to be placed in service on Burma and New Cape Central railways, former having 2-8-0—0-8-2 wheel arrangement, and latter 2-6-2—2-6-2 arrangement.

The First "Garratt" Locomotive in Great Britain. Ry. Gaz., vol. 40, no. 24, June 13, 1924, pp. 844-847, 7 figs. Working of Garratt locomotive employed at Hafod copper mills of Vivian & Sons, Swansea.

The Latest Garratt Locomotive Development.

Ry. Gaz., vol. 41, no. 13, Sept. 26, 1924, pp. 408-409, 2 figs. Engine, constructed for Burma railways, is first of its kind to be constructed with eight coupled wheels, and is reputed to be largest locomotive yet constructed for meter gage.

Gasoline. See British Empire Exhibition.

German. E-h 2 Tender Locomotives for Secondary Lines of the Former Württemberg State Railways (E-h 2 Nebenbahn Tenderlokomotive der früheren Württembergischen Staatsbahn), Dannecker. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 13, Oct. 15, 1924, pp. 292-294, 2 figs. Design and construction of locomotive built by Esslingen Co. for maximum axial load of 12.5 tons; able to take curves down to 100 m. radius; maximum speed 50 km.p.h.

Modern Locomotives of the German State Railway (Neuere Lokomotiven der Deutschen Reichsbahn), F. Meineke. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 12, Mar. 22, 1924, pp. 273-276, 7 figs. Describes four new types; features that these locomotives have in common are large grates, bar frames and free axles; critical discussion and method of calculating superheater and frame.

Recent Developments in Locomotive Design in Germany, F. Meineke. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 906-907. Discusses use of superheat, feedwater heating, employment of higher temperatures and pressures, and use of condensation; internal-combustion locomotives, and hydrogen locomotive, for which gas is produced by electrolytic decomposition of water. (Abstract.) Translated from Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, p. 937.

Greases for. See LUBRICANTS, Railroad Engine Greases.

Great Britain, 1923. British Locomotives of 1923. Engineer, vol. 137, no. 3549, Jan. 4, 1924, pp. 6-7, 6 figs. partly on supp. plate. Review of developments.

Headlight Sets Reclamation. Reclaiming Damaged Locomotive Headlight Sets. Ry. Elec. Engr., vol. 15, nos. 3 and 4, Mar. and Apr. 1924, pp. 69-71 and 103-106, 22 figs. Describes methods of repairing headlight turbo-generator sets at Cumberland shops of Baltimore & Ohio Ry.

High-Pressure. Delaware & Hudson Co. Two-Cylinder Compound Locomotive with High-Pressure Boiler. Ry. Rev., vol. 75, no. 24, Dec. 13, 1924, pp. 939-942, 1 fig. Super-locomotive called Horatio Allen, carrying 350 lb. boiler pressure develops tractive effort of 84,300 lb. with adhesion factor of 3.54.

Locomotive Evolution, J. Riekie. Ry. Engr., vol. 45, no. 538, Nov. 1924, pp. 373-375, 2 figs. Advocates use of very high pressures on compound principle, in conjunction with boiler of flash type.

Theoretical Savings Effected by Using High Pressures and Super-Heated Steam. Ry. & Locomotive Eng., vol. 37, no. 1, Jan. 1924, pp. 12-13, 1 fig. Analysis of heat required to produce various steam pressures and temperatures of superheat. Chart giving comparison of B.t.u. values of characteristics of saturated and superheated steam at different pressures and temperatures.

High-Speed. Railway Developments and the Evolution of High-Speed Locomotives (Le développement des chemins de fer et l'évolution de la locomotive à grande vitesse), M. Demoulin. Génie Civil, vol. 84, nos. 3 and 4, Jan. 19 and 26, 1924, pp. 60-64 and 85-89, 14 figs. Describes engine types built between years of 1850 and 1865, showing that many reputedly modern innovations are merely re-inventions, success of which was due to certain improvements in details or other factors.

Hungarian Railways. Present-Day Locomotive Practice in Hungary. Ry. Gaz., vol. 40, nos. 2, 4, and 7, Jan. 11, 25, and Feb. 15, 1924, pp. 49-52, 104-105, and 205, 10 figs. Jan.: Details of 2-6-6-0 Mallet compound locomotives of latest pattern introduced for working passenger and freight trains on Cammeral-Moravicz-Fiume section of Budapest-Fiume line. Jan. 25: Particulars of 2-8-2 tank locomotive, having 22½-in. diam. cylinders, and 25,000 lb. tractive effort. Feb. 15: Notes on 2-6-2 suburban tank locomotive; boiler pressure 156 lb. per sq. in.

Improvements. Locomotives. G. Greenough. Ry. Club of Pittsburgh—Proc., vol. 24, no. 1, Nov. 28, 1924, pp. 5-13 and (discussion) 13-21. Discusses improvements in design and process of manufacturing locomotives.

Internal-Combustion. Crude-Oil Engine Shunting Locomotive. Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 701-703, 10 figs. Locomotive constructed by Swiss Locomotive & Machine Works, Winterthur, Switzerland, is built for standard gage; engine works on 4-stroke cycle and utilizes airless injection for fuel.

Internal Combustion Locomotive Development, T. Grime. Machy. Market, no. 1248, Oct. 3, 1924, pp. 27-28. Thermal and economic aspect; consideration of problem of adapting internal-combustion engine to locomotive purposes; the direct-acting engine; geared, electric, and hydraulic transmissions.

Mountain Trains with Internal-Combustion Locomotives (Bergbahnen mit Motorbetrieb), W. Müller. Motorwagen, vol. 27, no. 11, Apr. 20, 1924, pp. 186-190, 6 figs. System recommended by author for rack railway in the Bavarian Alps, consisting of trains with internal-combustion locomotives in place of steam or electric locomotives.

The "Still" System Internal Combustion Locomotive. Ry. & Locomotive Eng., vol. 37, no. 1, Jan. 1924, pp. 14-15. Notes on new development by Still Engine Co.; 2-6-2 type. From Locomotive Mag. Ry. Carriage & Wagon Rev.

See also Diesel-Electric; Diesel-Engined; Switching.

Long Runs. Extension of Locomotive Runs, F. E. Russel. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 464-467. Discusses advantages of long runs and mechanical difficulties encountered. Abstract of paper read before Pac. Ry. Club.

Long Locomotive Runs, F. E. Russell. Pacific Ry. Club—Proc., vol. 7, no. 12, Mar. 1924, pp. 9, 11, 13, 15 and 17-27, and (discussion) 27-39. Traces briefly development of steam locomotive in past 100 years. Shows that there is ample opportunity for improvement by obtaining greater mileage out of locomotives by increasing length of runs; gives list of 34 railways that have increased locomotive runs. Modern appliances and improvements in design and material that contribute to making long runs economical.

Long Locomotive Runs on the Norfolk & Western Ry. Ry. Rev., vol. 74, no. 5, Feb. 2, 1924, pp. 203-207, 8 figs. Account of experience in developing practice of locomotive runs in passenger service over multiple divisions; special reference is made to type of locomotive which made these runs possible, and details are given of construction of tenders whose increased capacity was essential feature.

Lubrication. Force Feed Lubrication on Locomotives, A. H. Woodward. Ry. Mech. Engr., vol. 93, no. 3, Mar. 1924, pp. 151-152, 4 figs. Describes an original method by which oil is automatically supplied to the various bearing surfaces.

Locomotive Valve and Cylinder Lubrication, W. J. Schlacks. Ry. & Locomotive Eng., vol. 37, no. 5, May 1924, pp. 148-150, 1 fig. Schlacks force-feed lubricator; valve and cylinder lubrication of super-heater locomotives.

Lubrication and its Effect on Locomotive Serv-

ice. Ry. Age, vol. 77, no. 13, Sept. 27, 1924, pp. 558-561. See also Ry. & Locomotive Eng., vol. 37, no. 11, Nov. 1924, pp. 343-347. Value of specific gravity and viscosity tests questioned; cylinder oil must be atomized; direct feed to cylinders unnecessary; fraction and temperature tests with different oils; etc.

Lubrication of Locomotives and Cars from the Standpoint of the Operating Department, D. Wood. Pac. Ry. Club—Jl., vol. 3, no. 8, Nov. 1924, pp. 3, 5, 7, and 9. Consideration of material, appliances and men concerned with locomotive and car lubrication.

Mallet. Baldwin Mallet Locomotive for India. Ry. Gaz., vol. 41, no. 5, Aug. 1, 1924, pp. 154-155, 2 figs. Baldwin Locomotive Works recently delivered to North Western Ry., India, powerful Mallet locomotive developing tractive force of 52,600 lb. at 85 per cent boiler pressure.

Hungarian Mallet with Brotan Type Boiler. Ry. Age, vol. 77, no. 10, Sept. 6, 1924, pp. 407-410, 4 figs. See also Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 583-586, 4 figs. Describes locomotive built at Budapest by Hungarian State Rys. for heavy freight service between Fiume and Moravica; steam pressure, 220 lb.; total evaporative heating surface, 2918 sq. ft.; weight 241,000 lb.

Mallet Compound Locomotive for North Western (State) Railway of India. Ry. Rev., vol. 75, no. 21, Nov. 22, 1924, pp. 821-824, 3 figs. Describes 2-6-6-2 type articulated locomotive built by Baldwin Locomotive Works, which is to be compared with Garratt 2-6-2—2-6-2 compound engine.

Motive Power of the Carolina Clinchfield & Ohio Ry. Ry. Rev., vol. 74, no. 23, June 7, 1924, pp. 1005-1017, 7 figs. Describes rebuilding of original Mallet locomotives and makes comparison with two types of new engines.

1D + D Four-Cylinder Compound Superheated Steam Locomotives (Mallet) for Dutch State Railways in Java [1D + D - Vierzylinder - Verbund - Heissdampf-Lokomotive (Mallet) der Holländischen Staatsbahnen auf Java], A. Frey. Hanomag-Nachrichten, vol. 11, no. 132, Oct. 1924, pp. 165-180, 25 figs. Details of design and construction; tractive effort up to 18,900 kg., speed 30 km.p.h. for gradients of 25 per mill and 300 ton trains.

Simple Mallets for the Chesapeake & Ohio. Ry. Age, vol. 76, no. 19, Apr. 12, 1924, pp. 927-929, 4 figs. See also description in Ry. Rev., vol. 74, no. 14, Apr. 5, 1924, pp. 631-640, 13 figs. 2-8-8-2 type designed to meet restricted clearances; rated tractive force, 103,500 lb.

2-8-8-2 Type Simple Mallet Locomotive for the Chesapeake and Ohio Railroad. Engineering, vol. 118, nos. 3076 and 3078, Dec. 12 and 26, 1924, pp. 795-798 and 860-861, 39 figs. partly on supp. plate. Details of articulated locomotive built by Am. Locomotive Co., Schenectady, N. Y.

Manganese-Steel Parts. See MANGANESE STEEL, Locomotive.

Mastodon Type. See Types.

Mechanical Draft. Report on Front-Ends, Grates and Ashpans, E. C. Schmidt. Ry. Rev., vol. 74, no. 23, June 7, 1924, pp. 999-1004, 6 figs. Devices for creating mechanical draft in locomotives and description of draft arrangements of oil-burning locomotive. (Abstract.) Report of committee to Int. Ry. Fuel Assn.

Mechanically Fired. What Effect Will the Mechanically Fired Locomotive Have on the Future Engineer? Ry. & Locomotive Eng., vol. 37, no. 10, Oct. 1924, pp. 300-302. Committee report before Traveling Engrs.' Assn.

Meter-Gage. Metre Gauge Locomotives for the Madras & Southern Mahratta Railway (India). Ry. Gaz., vol. 41, no. 26, Dec. 26, 1924, p. 825, 2 figs. New Engines, of 4-6-0 and 4-8-0 types respectively, introduced for working heavy passenger and freight traffic.

Mikado. Canadian National Mikado Type Locomotive, C. E. Brooks. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 6-9, 7 figs. Belspaire fireboxes and extended side sheets reduce troubles from bad water in Western Canada.

4-Cylinder 2-8-2 Express Locomotive, Italian State Railways. Ry. Gaz., vol. 40, no. 17, Apr. 25, 1924, pp. 606-607, 2 figs. Particulars of locomotives with large diameter coupled wheels introduced for working heavy passenger trains on heavily graded sections of Rome-Naples and Rome-Florence lines; boiler pressure, 200 lb. per sq. in.; tractive effort, 8820 lb.

Mikado Type Locomotive, Canadian National Rys. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 12-16, 7 figs. Description of 45 engines designed largely to Can. Nat. standards especially for conditions in western Canada; cylinders, 27 in. by 30 in. diam.; driving wheels, 63 in. diam.; boiler pressure, 185 lb.; tractive power, 54,600 lb. without booster and 65,000 lb. with.

Mikado Type Locomotive, Elgin Joliet & Eastern Ry. Ry. Rev., vol. 75, no. 9, Aug. 30, 1924, pp. 317-320, 3 figs. Gives weights and dimensions of Elgin, Joliet & Eastern Ry. 2-8-2 type locomotives; engines are similar in design and construction to U.S.R.A. heavy Mikado locomotives.

Mikado Type Locomotive for Canadian National. Ry. Age, vol. 76, no. 4, Jan. 26, 1924, pp. 281-282, 1 fig. Boiler with Belspaire firebox special features; cylinders 27-in. diameter by 30-in. stroke; driving wheels 63-in. diameter with 56-in. cast steel centers; boiler pressure, 185 lb.; rated tractive force, 54,600 lb.; 2-8-2 type.

Mikado Type Locomotives, Canadian National Railways. Can. Ry. & Mar. World, no. 312, Feb. 1924, pp. 53-55, 4 figs. See also Boiler Maker, vol. 24, no. 2, Feb. 1924, pp. 45-47, 2 figs. Belspaire boiler; 27 by 30 in. cylinder; working pressure, 185 lb.; maximum tractive power 54,600 lb.

New Mikado-Type Locomotive for Heavy High-Speed Traffic (Nuove locomotive Mikado (1-4-1) a grande velocità per treni diretti pesanti su linee accidentate delle Ferrovie dello Stato Italiano), Enrico Levi. Rivista tecnica delle Ferrovie Italiane, vol. 25, no. 4, April 15, 1924, pp. 109-117, 7 figs. Illustrated description of new 4-cylinder compound 2-8-2 engine designed by engineers of Italian State Railways.

New Mikado Type Locomotives for the Wabash R. R. Ry. Rev., vol. 74, no. 13, Mar. 29, 1924, pp. 593-599, 6 figs. New 2-8-2 type freight engines somewhat larger than other locomotives of same type in use on this road.

Three-Cylinder Mikado for the South Manchurian. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 656-659, 5 figs. Unusual test methods provide accurate data on performance of 2-8-2 locomotive.

Two Light Mikado Locomotives Built at Lima. Ry. Age, vol. 76, no. 9, Mar. 1, 1924, pp. 505-506, 2 figs. Designed for local conditions but approximately same capacity as U.S.R.A. light Mikados.

See also French Rys.; Pacific Type; Tank; Three-Cylinder; Types.

Mine. See MINE LOCOMOTIVES.

Mixed-Traffic. New Mixed-Traffic Locomotives for the Great Southern & Western Railway, Ireland. Ry. Engr., vol. 45, no. 537, Oct. 1924, pp. 345-348, 8 figs. Tests made with first of series have proved adaptability of class for handling fast passenger trains, although primarily built for freight traffic.

Mountain Type. Central of Georgia Ry. Mountain Type Passenger Locomotives. Ry. Rev., vol. 75, no. 13, Sept. 27, 1924, pp. 457-460, 4 figs. New 4-8-2-type passenger locomotive constructed by Am. Locomotive Co. for handling heavy passenger trains; equipped with Nicholson thermic siphons.

Heavy 4-8-2 Type Southern Pacific Locomotives. Ry. Age, vol. 76, no. 6, Feb. 9, 1924, pp. 375-377, 3 figs. See also Ry. Rev., vol. 74, no. 6, Feb. 9, 1924, pp. 250-256, 6 figs. Designed to haul 12 passenger cars on 2-per cent grades and run 815 mi.

Lehigh Valley Three-Cylinder Locomotive Tests. Ry. Age, vol. 76, no. 15, Mar. 15, 1924, pp. 755-757, 13 figs. 4-8-2 type built by Am. Locomotive Co. handles heavy tonnage with low fuel consumption; results of tests; performance on grades.

Southern Pacific 4-8-2 Type Locomotives. Ry. Mech. Engr., vol. 98, no. 3, Mar. 1924, pp. 141-146, 10 figs. Description of locomotives designed to haul trains of 12 passenger cars on 2 per cent grades and run 815 miles (between Los Angeles, Cal., and El Paso, Tex.); rated tractive force, 85 per cent, 57,510 lb., and with booster, 67,660 lb.

See also Algerian State Railways.

Oil-Burning. How to Improve Oil Burning on Locomotives. Ry. Age, vol. 77, no. 13, Sept. 27, 1924, pp. 555-558. See also Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 592-594; Ry. & Locomotive Eng., vol. 37, no. 10, Oct. 1924, pp. 302-308; and Ry. Rev., vol. 75, no. 26, Dec. 27, 1924, pp. 1025-1027. Discusses burners, burner location, air openings, dampers, furnace design, and refractories.

Oil-Fuel Storage. See OIL FUEL, Locomotive, Storage and Distribution of.

Pacific Type. Chicago & Eastern Illinois Ry. 4-6-2 Type Locomotives. Ry. Rev., vol. 75, no. 6, Aug. 9, 1924, pp. 197-200, 3 figs. Modern heavy Pacific type locomotives handling through passenger runs; tractive effort, 43,900 lb., steam pressure, 200 lb.

New "Pacific" Type Locomotives, Northern Railway of France. Ry. Engr., vol. 45, no. 534, July 1924, pp. 244-245, 4 figs. Describes new 4-6-2 type express locomotive designed for working heavy boat and other express trains between Calais and Paris; is of 4-cylinder, compound type with h.p. cylinders outside frames driving middle pair of coupled wheels.

Pacific and Mikado Type Locomotive for Canadian Pacific Ry. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 690-697, 9 figs. Passenger and freight locomotives designed for handling heavy trains under severe weather conditions.

See also Baldwin; Bombay, Baroda & Central India Ry.; French Rys.; Super-Pacific.

Painting. See PAINTING, Cars and Locomotives.

Parts, Case-Hardening. See CASE-HARDENING, Locomotive Parts.

Parts, Manufacture. Examples of Modern Working Methods in the Production of Locomotive Parts (Beispiele über neuzeitliche Arbeitsverfahren in der Herstellung von Lokomotivteilen). Werkstattstechnik, vol. 18, no. 19, Oct. 1, 1924, pp. 533-536, 23 figs. Shows more economic production by using special machine tools and gives examples in forging, milling, and guiding.

Parts, Testing. Production and Testing in Locomotive Construction (Fabrikations und Prüfvorrichtungen im Locomotivbau). Werkstattstechnik, vol. 18, no. 18, Sept. 15, 1924, pp. 492-495, 11 figs. Details of methods followed by Linke-Hofmann works in Breslau for finishing and testing crossheads and guides.

Performance and Rating Methods. Notes on Locomotive Performance and Rating Methods, E. G. Young. Assn. Chinese & Am. Engrs.—Jl., vol. 5, nos. 9 and 10, Sept. and Oct. 1924, pp. 1-8 and 5-11, 8 figs. on supp. plates. Usefulness of information obtained from laboratory and road dynamometer tests to anticipate performance of a locomotive of modern design. Shows use of simple data and graphic methods in checking and predetermining motive-power performance under various conditions.

Recording the Course of a Locomotive, as Well as Work and Output of Dynamic Forces (Aufzeichnen des Fahrzeuglaufs nach Zeit und Weg sowie der Arbeit und Leistung der Bewegungskräfte), W. Müller. Bautechnik, vol. 2, no. 40, Sept. 16, 1924, pp. 433-440, 10 figs. A study in graphic dynamics. Time-road curve, driving power variable as to time and as to velocity; curves of work and performance; comparison between graphic statistics and dynamics.

Power and Efficiency Improvements. Power and Efficiency Improvements In Steam Locomotives, G. M. Basford. Engrs. & Eng., vol. 41, nos. 3 and 6, Mar. and June 1924, pp. 61-64 and (discussion) 64-69 and 159-162, 4 figs. Paper read at Conference on Economy in the Use of Fuel, held at Engrs. Club of Phila., Jan. 15, 1924.

Production Statistics, 1923. Record-Breaking Increase in Motive Power. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 77-82. Gives table of locomotive orders for 1923 for service in United States.

Pulverized-Fuel Firing. See PULVERIZED COAL, Locomotive Firing.

Rack. A New Rack Locomotive. Engineer, vol. 136, no. 3576, July 11, 1924, p. 55, 3 figs. Details of locomotive developed by Railgrip Syndicate, Ltd., Lond., Eng. A steam locomotive with an auxiliary pair of cylinders for driving a pair of wheels, having a positive grip on rails, through a set of speed-reducing gearing; auxiliary engine brought into operation only when gradient of line becomes so steep that usual driving wheels will not provide sufficient adhesion to move load.

See also Adhesion and Rack; Types.

Railway Service, Relation to. A Locomotive and Its Relation to the Railroad Service, C. B. Fletcher. Ry. Rev., vol. 75, no. 20, Nov. 15, 1924, pp. 795-796. Presents data relating to locomotive working year for freight and passenger service.

Rebuilt. Modernized Power From Reconstructed Locomotives. Ry. Rev., vol. 74, no. 9, Mar. 1, 1924, pp. 367-372, 9 figs. Account of overhauling of several classes of engines by Chicago Indianapolis & Louisville Ry. in its shops at La Fayette, Ind., illustrating methods by which Monon has practically made modern locomotives out of old, as engines pass through shops for repairs.

Repairing. A Record in Completing Class III Repairs. Ry. Rev., vol. 74, no. 16, Apr. 19, 1924, pp. 713-715, 12 figs. Time record for making class III locomotive repairs was established on Kansas City Southern Ry., Mar. 17, 1924, when locomotive No. 556 was put through shops at Pittsburg, Kan., in 7 hr. and 55 min.; manner in which work was planned, preparations made beforehand, and schedule on which it was executed.

French Shipyard Repairs American Locomotives, G. L. Carden. Ry. Age, vol. 76, no. 22, May 3, 1924, pp. 1106-1107, 4 figs. Engines formerly used by U. S. A. are being equipped with copper fireboxes at Penhoët shipyards at St. Mazaire and Nantes.

Locomotive Repairs at the Bellmead Shops, H. Campbell. Am. Mach., vol. 61, nos. 6 and 7, Aug. 7 and 14, 1924, pp. 219-221 and 257-259, 20 figs. Missouri, Kansas and Texas Ry. shops at Waco, Texas, equipped with new machinery

throughout; reducing costs by use of latest types of tools and attachments; design and use of special equipment. Machine driving boxes, special milling fixtures, grinding rods and links, etc.

Rebuilding Narrow-Gage Locomotives, H. Campbell. Am. Mach., vol. 61, no. 4, July 24, 1924, pp. 141-143, 10 figs. Details as to machining of small parts used in repairing of these locomotives.

Repairing Locomotives in a Manufacturing Plant, H. Campbell. Am. Mach., vol. 61, no. 9, Aug. 28, 1924, pp. 329-332, 10 figs. Details of some of the tools and methods used in a section of plant of Minneapolis Steel & Machinery Co., Minneapolis, Minn.

Repairing Locomotives Under Contract. Boiler Maker, vol. 24, no. 8, Aug. 1924, pp. 221-225, 13 figs. Beech Grove shop operating system developed by Railway Service & Supply Corpn. performs valuable service for Big Four.

See also Welding Practice; ELECTRIC WELDING, ARC, Locomotive Repairs; RAILWAY REPAIR SHOPS.

Resistance of. Locomotive Resistance and Tractive Force, K. Asakura. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 523-527, 9 figs. States that locomotive resistance should be partly represented as so many pounds per ton weight and partly as a function of mechanical efficiency. Formula for mechanical efficiency is developed and method of calculating tractive effort by applying mechanical efficiency explained. Results of calculation according to this method are nearly equal to those calculated by speed-factor method; can be applied to a locomotive whose boiler capacity is less than 100 per cent.

Rod Brasses. See MACHINING METHODS, Side- and Main-Rod Work.

Rod Failures. Locomotive Connecting Rod Failures. Ry. Engr., vol. 44, no. 527, Dec. 1923, pp. 457-460, 3 figs. Report to Ministry of Transport on accident at Betley Road, near Crewe, Lond. Midland & Scottish Ry.

Rod Repairs. Handling Rod Work at Battle Creek Shops, M. H. Westbrook. Ry. Mech. Engr., vol. 98, no. 7, July 1924, pp. 437-442, 18 figs. Rod repair department at Grand Trunk shops, Battle Creek, Mich., is equipped and laid out to take care of 22-pit repair shop, handling all classified repairs to 334 locomotives, including U.S.R.A. Mikado type; each man handles special work.

Rods, Boring and Testing of. Fixtures for Boring and Testing Locomotive Rods, F. H. Colvin. Am. Mach., vol. 60, no. 26, June 26, 1924, pp. 947-949, 8 figs. Some of the methods and tools used by Lima Locomotive Works in boring and testing side rods of plain and articulated types.

Running Repairs. Union Pacific Systematizes Running Repairs. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 694-696, 5 figs. Periodical detentions reduce locomotive maintenance costs 10 per cent with increased service.

Santa Fe Type. Building Freight Locomotives of Santa Fe Type, L. T. Rutledge. Can. Machy., vol. 32, no. 18, Oct. 30, 1924, pp. 19-21 and 42, 3 figs. Describes freight locomotive built by Can. Locomotive Co., Kingston, for Can. Nat. Ry., weighing, with loaded tender, 328 tons; 2-10-2 type.

Heavy Santa Fe Locomotives for B. & O. Ry. Age, vol. 76, no. 7, Feb. 16, 1924, pp. 413-414, 2 figs. Tractive force of 84,260 lb. obtained with 64-in. drivers; tenders of unusual capacity facilitate long runs.

Heavy 2-10-2 Type Locomotives for Baltimore and Ohio. Railroad Herald, vol. 28, no. 2, Jan. 1924, pp. 20-21, 1 fig. See also Ry. & Locomotive Eng., vol. 37, no. 1, Jan. 1924, pp. 19-20, 1 fig., and Ry. Mech. Engr., vol. 98, no. 2, Feb. 1924, pp. 73-76, 4 figs. Cylinders, 30 by 32 in.; driving wheels, 58 in. diam.; tractive effort, 84,260 lb.

Santa Fe Locomotives, Canadian National Railway. Can Ry. & Mar. World, no. 320, Oct. 1924, pp. 487-489, 4 figs. Built for heavy transfer service at Toronto, to operate between Mimico and Danforth; designated as T-t-a class; total weight, without tender, 409,000 lb.

2-10-2 Type Replace Mallets on Great Northern. Ry. Age, vol. 76, no. 8, Feb. 23, 1924, pp. 459-460, 1 fig. 3000 tons handled over 1.8-per cent grade by locomotives of 87,130-lb. tractive force; built by Baldwin Locomotive Works.

Scale for Weighing. See SCALES, Locomotive.

Shipment of. Packing, Loading and Shipment of Locomotives (Verpackung, Verladung und Versand von Lokomotiven), E. Metzeltin. Fördertechnik und Frachtverkehr, vol. 17, no. 10, May 22, 1924, pp. 135-140, 4 figs. Locomotives must comply with Bern agreements in order to pass over various European railroads. For transoceanic shipments locomotives must generally be taken apart.

Shops. Locomotive Workshops of the Linke-Hofmann-Lauchhammer A. G. in Breslau (Lokomotivwerkstätten der Linke-Hofmann-Lauchhammer Aktiengesellschaft in Breslau), K. Bernhard. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 35 and 40, Aug. 30 and Oct. 4, 1924, pp. 889-895 and 1053-1058, 46 figs. partly on supp. plate. Details of design and construction of machine shops, satisfying all requirements of modern heavy-type construction, especially latest equipment in cranes, heating, lighting, etc.

Stacks. Calculation of Locomotive Stacks (Ueber die Berechnung von Lokomotivschornsteinen), A. Giesl-Gieslin. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, nos. 43-44 and 47-48, Oct. 31 and Nov. 28, 1924, pp. 373-376 and 411-414, 9 figs. Economic importance of proper dimensioning; gives simple method of approximate calculation; energy losses through stack, design of stacks, etc.

Experimental Investigation of Locomotive Stacks (Experimentelle Untersuchung von Lokomotivschornsteinen), F. C. Huygen. Zeit. des österr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 27/28, July 11, 1924, pp. 248-251, 3 figs. Discusses course of temperature, pressure, and velocity of flow from smokebox to mouth of stack. Translated from Dutch.

Starters. The Street Locomotive Starter. Ry. Age, vol. 77, no. 14, Oct. 4, 1924, pp. 598-600, 5 figs. See also Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 702-704, 5 figs., and Ry. Rev., vol. 75, no. 13, Oct. 4, 1924, pp. 518-521, 6 figs. Describes starting device recently developed by C. F. Street, Greenwich, Conn. Consists essentially of two cylinders which are arranged parallel to each other, with their pistons and connecting rods.

Steam Separator. A Steam Separator for Locomotives. Engineer, vol. 138, no. 3594, Nov. 14, 1924, p. 566, 4 figs. Form of steam separator for installation in dome of locomotives.

Steam-Turbine. A New Geared Turbine Condensing Locomotive. Ry. Engr., vol. 45, no. 533, June 1924, pp. 200-201, 2 figs. Constructed on Reid-Macleod system and patented by North Brit. Locomotive Co.

A New Turbo-Locomotive for the German State Railways. Ry. Gaz., vol. 41, no. 16, Oct. 17, 1924, pp. 513-516, 9 figs. Designed and built at Krupp Works, Essen, and since subjected to experimental runs for testing purposes.

Condensing Steam Turbine Locomotives (Dampfturbinen-Lokomotiven mit Kondensation), R. Lorenz. Kruppsche Monatshefte, vol. 5, Nov. 1924, pp. 221-248, 46 figs. partly on supp. plate. Development and design of Zoelly, Ljungström,

and Krupp types; comparative cost and efficiency data; future developments.

Developments of the Ljungström Locomotive. Ry. Age, vol. 76, no. 17, Mar. 29, 1924, pp. 849-850, 2 figs. Its performance and later developments in design.

Economy, Design and Development of the Steam-Turbine Locomotive (Die Turbolokomotive, ihre Wirtschaftlichkeit, Bauart und Entwicklung), R. P. Wagner. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, nos. 1 and 2, Jan. 15 and Feb. 15, 1924, pp. 1-8 and 25-34, 17 figs. Discusses problems of design, and describes Ljungström, Ramsay, and Zoelly types.

Geared Turbine Condensing Locomotive. Ry. Age, vol. 77, no. 3, July 19, 1924, pp. 107-108, 1 fig. Mechanical, thermal, and economic advantages obtained with Reid-MacLeod steam-turbine-driven locomotive, built by North British Locomotive Co., Ltd., Glasgow, Scotland. Uniform torque gives rapid acceleration.

Ljungström Steam Locomotive (Ljungströms Locomotiv), I. F. Johansen. Ingeniören, vol. 33, no. 6, Feb. 9, 1924, pp. 61-68, 16 figs. Description of Swedish locomotive; great economy obtained by this design shown by test data; fuel consumption reduced about 50 per cent as compared to locomotives of usual design.

The First German Turbine Locomotive, R. Lorenz. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 165-166, 5 figs. Describes condensing turbine locomotive built in Germany by firm of F. Krupp, Essen; author states that introduction of steam turbines to drive locomotives would save railways 20 to 30 per cent of coal now consumed.

The First Krupp Turbine Locomotives (Die erste Kruppsche Turbinenlokomotive), R. Lorenz. Kruppsche Monatshefte, vol. 5, Aug.-Sept. 1924, pp. 129-136, 8 figs. Details of construction, bearings and lubrication, condensers, feedwater heaters, Schmidt superheaters, ventilators, etc.

The Ramsay Turbo-Electric Condensing Locomotive. Ry. Engr., vol. 45, no. 528, Jan. 1924, pp. 5-10 and 24, 11 figs. partly on supp. plates. Discusses developing and transmitting power, design of condenser, driving motors, speed regulation, and gives results of tests made on Lond. Midland & Scottish Ry. subsequent to modification of certain details, showing possibilities of this class of locomotive for working main-line passenger traffic.

The Zoelly Turbine-Driven Locomotive, H. Zoelly. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 653-660, 7 figs. Particulars of 1000-hp. experimental condensing locomotive provided with recooler for condensing water; theoretical considerations; fuel economy as compared with ordinary locomotive. (Abridged.)

Turbine Locomotive for British Railways. Ry. Gaz., vol. 41, no. 24, Dec. 12, 1924, pp. 768-769, 3 figs. Ljungström turbine condensing locomotive, under construction at works of Beyer, Peacock & Co., has been designed especially to meet British railway conditions.

Turbine Locomotives (Locomotives à turbines), M. Lamy. Revue Industrielle, vol. 54, no. 2181, Aug. 1924, pp. 217-221, 7 figs. Describes Escher Wyss type of Swiss Ry., Ljungström type in Sweden, their design, construction, and operation.

Turbo-Condensing Locomotives (Dampflokomotiven mit Kondensation). Glasers Annalen, vol. 94, no. 3, Feb. 1, 1924, pp. 25-31, 4 figs. Discussion by R. P. Wagner and others of paper by R. Lorenz, in which former claims that use of steam condensation in piston locomotives effects little or no improvement with regard to performance or economy.

Zoelly Turbine Locomotive. Engineer, vol. 138, no. 3593, Nov. 7, 1924, pp. 530-532, 4 figs. Features of new Swiss locomotive which has had remarkably successful trial trips.

Zoelly Turbo-Locomotive System (Die Turbolokomotive System Zoelly). Schweizerische Bauzeitung, vol. 84, no. 13, Sept. 27, 1924, pp. 151-152, 1 fig. Details of design and construction, including improvements based on some years of practical experience.

Steam and Electric, Comparison of. Steam and Electric Locomotives Compared. Ry. Gaz., vol. 41, no. 3, July 18, 1924, p. 90. Electric-locomotive traction enables large horsepower to be obtained from locomotives of reasonable length and with low axle loads.

Steel for. See ALLOY STEELS, Locomotive Parts.

Steep Grades. Locomotives for Steep Grades (Lokomotiven für starke Steigungen), Nordmann. Glasers Annalen, vol. 95, no. 6, Sept. 15, 1924, pp. 99-112, 13 figs. Describes a number of locomotive designs used in Germany for steep grades.

Superheater. 1 C 1 Superheater Tender Locomotives for One-Meter Tracks for Spain (Meterspurige 1 C 1-Heissdampf-Personenzug-Tenderlokomotiven für Spanien), W. Franke. Verkehrstechnik, vol. 41, no. 38, Sept. 19, 1924, pp. 468-471, 6 figs. Design, construction, and equipment of locomotives for La Robla Ry. Co.

1 E- (2-10-0) Two-Cylinder Superheated Goods Train Locomotive for the Polish State Railways. Eng. Progress, vol. 5, no. 2, Feb. 1924, pp. 29-34, 14 figs. See also description in Ry. Gaz., vol. 40, no. 12, Mar. 21, 1924, pp. 416 and 422, 3 figs. Locomotives built partly by Berlin Machine Co. and partly by Belgian works; requirements and characteristics; results of trial trips.

Recent Steam Collecting Boxes for Superheater Locomotives (Neuere Dampfsammelkästen für Heissdampflokomotiven), M. Igel. Wärme, vol. 47, no. 26, June 27, 1924, pp. 306-307, 8 figs. Details of boxes of ingot iron in place of cast iron or steel to avoid welding; 70 boxes used by German railways as test.

The Advantages of Highly Superheated Steam in Locomotives, R. S. York. Commonwealth Engr., vol. 11, no. 9, Apr. 1, 1924, pp. 359-363. Gives results of tests made on two locomotives of same dimensions, one fitted with superheater and one without.

Superheaters for. See SUPERHEATERS, locomotive.

Super-Pacific. The New Super-Pacific Type of Locomotives of the French Northern Railway Company (Note sur les nouvelles Locomotives "Super-pacific" de la Compagnie du Chemin de fer du Nord français). Revue Universelle des Transports, vol. 1, no. 14, Sept. 15, 1924, pp. 210-212, 2 figs. Particulars of new 4-6-2 type, having three-coupled driving wheels, for loads of 400-500 tons; Westinghouse brakes; electric lighting; speed 100 km.p.h.

Switching. A New Internal-Combustion Shunting Locomotive. Ry. Gaz., vol. 40, no. 16, Apr. 18, 1924, pp. 572-574, 6 figs. Particulars of the Vermont, gasoline-driven locomotive or tractor, designed to meet requirements of railway companies and industrial concerns; design based on simplicity of detail and economical operation.

Light-Weight Locomotives for Shunting Purposes. Indian & Eastern Engr., vol. 55, no. 1, July 1924, pp. 18-19, 3 figs. Discusses extended use of gasoline locomotive in classification yards; engine is of four-cycle internal-combustion type, having four water-jacketed cylinders (bore, 120 mm., stroke 140 mm.) and developing 40 hp. at 1000 r.p.m.

New 0-8-0 Heavy Switch Engines for Wabash Ry. Ry. Rev., vol. 74, no. 19, May 10, 1924, pp. 833-838, 8 figs. Modern switch engines for use in yard and transfer service at large terminals.

Oil-Electric Locomotive Built for Switching Service. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 390-391, 3 figs. Particulars of locomotive designed and built by Ingersoll-Rand Co. and Gen. Elec. Co. for N. Y. Central R. R. Co., for use in city streets; 300-hp. oil engine directly connected to a 200-kw. generator; four motors of a nominal rating of 95 hp. each, one of which is geared to each of four axles.

Oil-Engine Locomotive for Switching Service (Oelmotor-Lokomotiven für Rangierdienst). Schweizerische Bauzeitung, vol. 84, no. 7, Aug. 16, 1924, pp. 86-87, 7 figs. Details of design of 90-hp. 500-r.p.m. locomotive burning crude oil, developing 4000 kg. at drawbar.

Powerful Six-Wheel Switcher for the Monon. Ry. Mech. Engr., vol. 98, no. 11, Nov. 1924, pp. 660-661, 1 fig. Details of 0-6-0 switching locomotives which develop 42,000 lb. tractive force with 57-in. drivers and have total weight of 191,000 lb.

Rebuilt 0-6-0 Type Locomotive, London Midland & Scottish Railway. Ry. Gaz., vol. 41, no. 22, Nov. 28, 1924, p. 669, 2 figs. Engines originally designed and built for service in Turkey, now employed on Tilbury section of Lond. Midland & Scottish Ry.

Shipping Complete Locomotives to India. Ry. Engr., vol. 45, no. 530, Mar. 1924, pp. 95-96 and 108, 6 figs. Principal data on 0-6-0 type British-built locomotives delivered to East Indian Ry. at Calcutta.

Tank. Design of a Tank Locomotive (Entwurf einer C-Tender-Lokomotive), E. Herms. Praktische Maschinen-Konstrukteur, vol. 57, nos. 45, 47, and 48, Nov. 25, Dec. 9, and 16, 1924, pp. 605-608, 635-636, and 649-650, 2 figs. Design and calculations for a standard gage tank locomotive for branch line, capable of pulling a train of 100 tons gross weight at a speed of 16 km. over a gradient of 1:50 and a curve of 80 m. radius.

Four-Cylinder "Baltic" Tank Engine—London Midland & Scottish Railway. Ry. Gaz., vol. 41, no. 3, July 18, 1924, pp. 82-83, 3 figs. 4-6-4 type four-cylinder tank engine built at Horwich works of London Midland & Scottish Ry. for use in dealing with heavy suburban traffic over severely graded lines, also for hauling express residential trains within radius of about 50 miles.

L. M. S. Rly.—"Baltic" Tank Engines. Engineer, vol. 138, no. 3595, Nov. 21, 1924, pp. 582-584, 7 figs. Details of Horwich-built 4-cylinder superheated 4-6-0 locomotive.

New Four-Cylinder "Baltic" 4-6-4 Type Tank Engine, London Midland & Scottish Railway. Ry. Engr., vol. 45, no. 532, May 1924, pp. 166-169, 6 figs. Also Engineer, vol. 137, no. 3565, Apr. 25, 1924, p. 454, 2 figs.; and Ry. Gaz., vol. 40, no. 14, Apr. 4, 1924, pp. 503-506, 6 figs. Particulars of locomotives being constructed at Horwich Works for heavy suburban work and short-distance express residential traffic; total boiler heating surface, 1997 sq. ft.; working pressure, 180 lb. per sq. in.

New Goods Tank Locomotives, London Midland & Scottish Railway. Ry. Gaz., vol. 41, no. 7, Aug. 15, 1924, p. 215, 2 figs. Construction of inside-cylinder-type 0-6-0 engines for Lond., Midland & Scottish Ry.; cylinders; diameter, 18½ in.; piston stroke, 26 in.; wheelbase, 16 ft. 6 in.

New 2-8-2 Type Tank Engines for the East Indian Railway. Ry. Engr., vol. 45, no. 534, July 1924, pp. 243 and 245, 2 figs. Particulars of locomotives intended expressly for shunting heavy goods trains brought in by main line locomotive built by Beyer, Peacock & Co., Ltd., Manchester, Eng.

Ten-Wheel. A New Pennsylvania R. R. Locomotive. Ry. Gaz., vol. 40, no. 25, June 20, 1924, pp. 891-892, 2 figs. Particulars of first of a new class of locomotives designed for passenger train service and built at company's shops at Altoona, Pa.; 4-6-0 type, with outside cylinders driving middle pair of coupled wheels, steam being distributed to cylinders by piston valves actuated by Walschaerts valve gear; light reciprocating parts; high tractive effort.

Maine Central Purchases Ten-Wheel Locomotives. Ry. Age, vol. 76, no. 10, Mar. 8, 1924, pp. 555-556, 1 fig. Modern design of medium capacity with 63-in. drivers suitable for local passenger or freight traffic.

New 4-6-0 Mixed-Traffic Locomotive, Great Southern & Western Railway, Ireland. Ry. Gaz., vol. 41, no. 5, Aug. 1, 1924, pp. 148-150, 4 figs. Tests made with first of these engines show that, although primarily built for handling goods traffic, class will also be useful for working fast passenger trains, thus ranking them as mixed-traffic locomotives.

New 4-6-0 Type Metre Gauge Locomotives, Bombay, Baroda & Central India Railway. Ry. Gaz., vol. 40, no. 24, June 13, 1924, pp. 848-850, 6 figs. Features of interest of engines which are largest in use on Indian meter-gage lines.

New Locomotives for Indian Railways. Ry. Gaz., vol. 41, no. 6, Aug. 8, 1924, pp. 181-183, 4 figs. 4-6-0 type engines with superheaters, built by Wm. Beardmore & Co., Ltd., for Bombay, Baroda & Central India and Madras & Southern Mahratta Rys. for working on 5-ft. 6-in. gauge; tractive force, at 75 per cent boiler pressure, 19,488 lb.

Pennsylvania Ten-Wheel Passenger Locomotive. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 16-18, 3 figs. Class G5S, new design for local passenger service with 68-in. drivers, develops 41,328-lb. tractive force.

See also British Empire Exhibition.

Tenders. Exhaust-Steam-Driven Tenders with Piston Locomotives (Abdampftriebtender bei Kolbenlokomotiven), R. P. Wagner. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 7, July 15, 1924, pp. 141-144. Discusses tender fitted with engine using exhaust steam of piston engine, and gives details of equipment and operation.

Terminals. See TERMINALS, LOCOMOTIVE.

Testing. Testing Locomotives on the Great Western Railway. Ry. Gaz., vol. 41, no. 7, Aug. 15, 1924, pp. 216-221, 8 figs. Abstract of paper read before First World Power Conference.

Unusual Method of Testing Steam Locomotives. Ry. Age, vol. 77, no. 17, Oct. 25, 1924, pp. 733-734, 2 figs. See also Ry. Rev., vol. 75, no. 17, Oct. 25, 1924, pp. 611-615, 10 figs. Describes use of regenerative braking feature of electric locomotive for determining drawbar pull of 3-cylinder Mikado locomotive.

Tests. Locomotive Tests on the Great Western Railway. Ry. Gaz., vol. 40, no. 18, May 2, 1924, pp. 637-642, 9 figs. Trials recently carried out between Swindon and Plymouth and vice versa with new 4-cylinder 4-6-0 type express locomotive, no. 4074, "Caldicot Castle," to obtain detailed information as to performance of locomotives of "Castle" class.

Thermal Efficiency. Engineering and Business Considerations of the Steam Locomotive, W. H. Winterrowd. Ry. Age, vol. 76, no. 30, June 13, 1924, pp. 1468-1471 and (discussion) 1471-1473, 3 figs.; also Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1103-1108, 4 figs. Author disputes impression that steam locomotive is inefficient and losing its vitality; comparison of thermal efficiency curves of locomotive and stationary boiler proves conclusively that locomotive boiler is more efficient generator of steam; and by further development of superheated steam, larger grate area and higher boiler pressure, still greater maximum thermal efficiency can be obtained.

Thermo. Investigation of Thermo-locomotives (Zur Untersuchung von Thermolokomotiven), G. Lomonossoff. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 33, Aug. 16, 1924, pp. 849-852, 11 figs. Discusses methods free from objection by which thermo and steam locomotives may be compared as to efficiency.

Three-Cylinder. Development of the Three-Cylinder Locomotive (Entwickelung der Dreizylinder-Lokomotiven), Severin. Hanomag-Nachrichten, vol. 11, no. 127, May 1924, pp. 73-92, 36 figs. Historical development since 1846 in various countries; describes numerous designs; technical data of all known three-cylinder steam locomotives.

L. V. Tests of Three-Cylinder Locomotive. Ry. Mech. Engr., vol. 98, no. 4, Apr. 1924, pp. 203-206, 9 figs. See also Ry. & Locomotive Eng., vol. 37, no. 4, Apr. 1924, pp. 103-105, 13 figs. Fast movement of heavy trains produced with low fuel consumption and high boiler efficiency; results of tests run on Lehigh Valley mountain-type locomotive no. 5000, for freight service.

Lehigh Valley Three-Cylinder Locomotive. Ry. Age (Daily Edition), Vol. 76, no. 32, June 14, 1924, pp. 1585-1587, 6 figs. Details of 4-8-2 type, weighing 369,000 lb.; boiler is of inverted wagon-top type. See also article, entitled Performance of 3-Cylinder Locomotive No. 5000, in Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1079-1093, 13 figs. Gives details of construction and record of results.

New Series 2-6-0 Type Locomotive, London & North Eastern Railway. Ry. Gaz., vol. 41, no. 18, Oct. 31, 1924, pp. 582-583, 2 figs. Details of 3-cylinder, express-goods engines, fitted with new standard tender.

The Steam Locomotive, J. G. Blunt. St. Louis Ry. Club—Proc., vol. 29, no. 7, Nov. 14, 1924, pp. 118-125 and (discussion) 125-132. See (abstract) in Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, 359-361. Presentation of advantages of three-cylinder locomotive.

The Three-Cylinder Locomotive, J. G. Blunt. Ry. Age, vol. 76, no. 30, June 13, 1924, pp. 1473-1476 and (discussion) 1476-1479, 7 figs. Normal tractive force; economy of 3-cylinder locomotive; crank-axle driving box; middle main rod, valve gear and crosshead.

Three-Cylinder Locomotive for the South Manchurian Ry. Ry. & Locomotive Eng., vol. 37, no. 11, Nov. 1924, pp. 325-332, 11 figs. Details embodied in Mikado 2-8-2 design of Am. Locomotive Co.

Three Cylinder Superheated Steam Express Locomotive of the German State Railways. Ry. & Locomotive Eng., vol. 37, no. 3, Mar. 1924, pp. 75-78, 3 figs. German argument against use of two-cylinder compound locomotive; describes type of three-cylinder locomotive first built at Borsig shops in Tegel in 1922 and now being used somewhat extensively on German railways.

Three-Cylinder Locomotives, Jas. Partington. South. & Southwest. Ry. Club—Proc., vol. 17, no. 12, Nov. 1924, pp. 16, 19-20, 23-24, 25-26, 31-32, 35-36, and 39, 1 fig. Principal changes in design between 2- and 3-cylinder locomotive are in cylinder arrangement, crank axle, and valve gear; advantages as compared with 2-cylinder engines.

See also British Empire Exhibition; Mikado.

Tire-Flange Welding. Welding Locomotive Tires. Ry. & Locomotive Eng., vol. 37, no. 1, Jan. 1924, pp. 21-23, 7 figs. Details of investigation made to determine effect on strength of material produced by local heating when building up worn tire flanges by either gas or electric process of welding.

Tire Practice. Locomotive Tire Practice on the Santa Fé, F. H. Colvin. Am. Mach., vol. 60, no. 19, May 8, 1924, pp. 697-698, 6 figs. Wheel gages and calipers, and how the are used; mating of tires by carbon content as well as size; standard shims; shrinkage allowance.

Tires and Forgings, Manufacture. Processes and Principles Involved in the Manufacture of Locomotive Tires, Locomotive Forgings and Rolled Steel Wheels for Railway Service, L. H. Fry. South. & Southwest. Ry. Club, vol. 17, no. 11, Sept. 1924, pp. 11-12, 15-16, 17-18, 23-24, and 27-28 and (discussion) 31-32, 35-36, and 39, 12 figs. Principles underlying processes of manufacture..

Tires, Shrink Fits. Material Stresses in Shrunkon Wheel Tires (Beräkning av materialpakänningar vid pakrympning av hjulringar), J. S. Fries. Teknisk Tidskrift, vol. 54, no. 5, May 17, 1924, pp. 54-55 (Mekanik) 4 figs. Theoretical investigations moderate that allowance for shrink fit should not exceed 0.001 in. diameter in case of soft steel and 0.00075 in. in case of hard steel tires.

Tracking Qualities, Testing. Otheograph Records Locomotive Characteristics, P. M. Gillilan. Ry. Age, vol. 77, no. 7, Aug. 16, 1924, pp. 283-286, 9 figs. Use of device properly calibrated gives accurate determination of tracking qualities of equipment.

Twelve-Wheel. 4-8-0 Type Locomotive for the Buenos Ayres Great Southern Railway. Ry. Engr., vol. 45, no. 535, Aug. 1924, p. 291, 1 fig. See also Ry. Gaz., vol. 41, no. 4, July 25, 1924, p. 119. Engine built by W. G. Armstrong, Whitworth & Co., Ltd., for Buenos Ayres Gt. Southern Ry. is oil-burning type having three single-expansion cylinders and 4-8-0 wheel arrangement.

2-8-2. See Baldwin.

Turbine. See Steam-Turbine.

Turbo. See Steam-Turbine.

Turbo-Electric. See Steam-Turbine.

Type and Size Designation System. New System of Designation of Type and Size of Locomotives of German State Railways and Their New Serial Numbers (Die neue Gattungsbezeichnung und Nummerung des Lokomotivparks der Deutschen Reichsbahn), W. Müller. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 8, July 30, 1924, pp. 157-166. Explains in detail principles on which new system of locomotive symbols is based. Gives tables of new symbols.

Types. Modern Locomotive Types (Zusammenstellung neuerer Lokomotivbauarten), C. Müller. Praktischer Maschinen-Konstrukteur, vol. 57, no. 7, Feb. 25, 1924, pp. 69-76, 18 figs. Adhesion, rack, and combined adhesion and rack locomotives; passenger and freight locomotives with and without tenders.

Passenger Steam Locomotives With Four-Coupled Axles (Personenzug-Dampflokomotiven mit vier gekuppelten Achsen), E. Lassueur. Schweizerische bauzeitung, vol. 84, no. 12, Sept. 20, 1924, pp. 143-147, 7 figs. Compares design of types of locomotives of Mikado and Mastodon class used in various countries including United States, Germany, France, Austria, and Spain.

Some Recent Notable Locomotives, J. Partington. Can. Ry. Club—Proc., vol. 23, no. 1, Jan. 1924, pp. 21-32 and (discussion) 32-39, 2 figs. See also Ry. & Locomotive Eng., vol. 37, no. 2, Feb. 1924, pp. 39-41, 1 fig. Characteristics and performances of several recent designs of locomotive.

Types Built in 1923. Locomotives. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 52-63, 30 figs. Mikado, Pacific, mountain, 2-10-2, 2-10-0, Mallet, Consolidation, and switching types locomotives ordered by Class I railroads in 1923, and principal dimensions and illustrations of these representative types.

Uniflow. A Uniflow Locomotive is Built for

Russia, J. Stumpf. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 517-521, 8 figs. See also Ry. Age, vol. 77, no. 8, Aug. 23, 1924, pp. 327-331, 8 figs. Describes 0-10-0 type locomotive built by Nydquist & Holm, Trollhättan, Sweden, for Russian government; equipped with a Walschaerts valve gear. A remarkably high vacuum has been obtained by redesigning cylinder exhaust pipes.

Valve-Gear Setting. Helpful Suggestions for Setting Valve Gear, H. W. Stowell. Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 596-597, 1 fig. Simple formulas used to obtain correct alterations for eccentric rods and valve rods.

Valve Gears. Development of the Lentz Poppet Valve Gear, A. Niklitchek. Ry. Mech. Engr., vol. 98, no. 7, July 1924, pp. 407-409, 4 figs. Discusses valve-gear maintenance costs, lubricant and water consumption reduced on Austrian locomotives.

Elimination of Errors in Stephenson Valve Motion, R. C. Beaver. Ry. Mech. Engr., vol. 98, no. 4, Apr. 1924, pp. 214-216, 6 figs. Method for determining offset of link saddle pin and principal factors in design.

The Walschaert Locomotive Valve-Gear, R. C. Bond. Instn. Mech. Engrs.—Proc., vol. 2, no. 6, 1923, pp. 1137-1141, 2 figs. Detailed consideration of Walschaert valve gear. (Abridged.)

Velocity Profiles. The Preparation and Use of Velocity Profiles, V. I. Smart. Ry. Rev., vol. 74, no. 5, Feb. 2, 1924, pp. 209-215, 7 figs. Tractive effort, coal consumption, and running time may be obtained graphically from velocity profiles, prepared in accordance with principles laid down by Am. Ry. Eng. Assn.

Venezuela R. R. Locomotives of the Great Venezuelan Railroad [Die Lokomotiven der Grossen Venezuela-Eisenbahn (Südamerika)], E. Neuhaus. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 6, June 15, 1924, pp. 129-132, 7 figs. Design, construction, and equipment of various types of locomotives for Caracas-Valenzia line.

Welding Practice. Standardizing Welding Practice in Locomotive Shops, J. S. Heaton. Boiler Maker, vol. 23, no. 16, Oct. 1924, pp. 295-297. Suggestions for good welding practice, which have proved their merit in shops of Wabash System, Decatur, Ill. Discusses methods of maintaining records of welding, arrangement of a welding shop, system of carrying out firebox repairs with the process, flue welding and care of equipment.

Wheel-Center Counterweights. Calculating Counterweights of Wheel Centers for B+B Mallet Tender Locomotives of 250 Horsepower (Berechnung der Gegengewichte an den Radsternen für eine B+B-Mallet-Tender-Lokomotive von 250 PS.), E. Herms. Verkehrstechnik, vol. 41, no. 48, Nov. 28, 1924, pp. 625-628, 2 figs. Discusses disturbing action in running of locomotive and gives a complete example of calculation.

Wind. The "Wind-Locomotive," I. P. Church. Sibley Jl. Eng., vol. 38, no. 9, Dec. 1924, pp. 214-216 and 236, 4 figs. Describes two working models, designed and constructed by author 20 years ago, of wind locomotives which, when completely immersed in current of air, could proceed directly against it, deriving their power from this very current.

LOGGING

Tractors, Use in. See TRACTORS, Caterpillar.

LONARITE

Composition and Uses. Lonarite (Lonarit), Willers. Kunststoffe, vol. 14, no. 3, Mar. 1924, pp. 36-37, 4 figs. A product of acetyle (cellulose), a fireproof composition, which can be pressed in almost any shape; produced in different degrees of hardness; can be used as electrical insulators and for a multitude of objects.

LUBRICANTS

Automobile-Engine. See AUTOMOBILE ENGINES, Lubricants.

Dewaxing. Refrigeration as Applied to Dewaxing of Lubricants, L. D. Jones. Ice & Refrigeration, vol. 67, no. 2, Aug. 1924, pp. 92-93. Discusses refrigeration of oil to throw wax out of solution; utilization of centrifugal force in separation of precipitated wax from oil.

Greases. See GREASES.

Handling and Storage. Good Practice in Handling and Storing Lubricants. Lubrication, vol. 10, no. 1, Jan. 1924, pp. 1-12, 13 figs. Discusses factors involved in storage of lubricants, including construction of oil house or oil room, storage tanks and their accessory equipment, equipment for handling products and shipping containers, extent to which semi-solid lubricants are to be used, etc.

Oils. See LUBRICATING OILS.

Railroad Engine Greases. The Manufacture of Railroad Engine Greases, H. L. Kauffman. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 13-14. Discusses materials and processes entering into production of these lubricants.

Specifications and Testing Methods. United States Government Specification for Lubricants and Liquid Fuels and Methods for Testing. U. S. Bur. Mines—Technical Paper no. 323A, 1924, 89 pp., 21 figs. Specification officially adopted by Federal Specifications Board Feb. 3, 1922, for use of departments and independent establishments of government in purchase of materials covered by it.

Standardization. Motor Lubricants Standardised, W. Blackwell. Motor Transport (Lond.), vol. 39, no. 1016, Aug. 18, 1924, pp. 203-205. Proposal for standard specifications for different-purpose oils; discusses merits of scheme.

Storage and Distribution. Money-Saving Methods Used in the Purchase, Storage and Distribution of Lubricants, H. Freeman. Indus. Engr., vol. 82, no. 10, Oct. 1924, pp. 475-477, 4 figs. How $6229 was saved during one year by a bulk storage and delivery system for Manufacturing departments of Allis-Chalmers Mfg. Co.

LUBRICATING OILS

Auto-Ignition. The Auto-Ignition of Oils and Fuels (Ueber Selbstentzündung von Oelen und Brennstoffen), H. Jentzsch. Zeit. des Vereines deutscher Ingenieure, vol. 44, no. 68, Nov. 1, 1924, pp. 1150-1152, 6 figs. Lubricating oil as cause of gas explosions; determination of auto-ignition capacity in oxygen; auto-ignition without oxygen addition; tests with oil mixtures; influence of oxidation; calculation of auto-ignition of required air volumes; requirements of oils and fuels.

Automobile-Engine. Lubricating Oils for Automobile Engines (Die Schmieröle für Automobilmotoren), H. Franz. Motorwagen, vol. 27, no. 7, Mar. 10, 1924, pp. 105-108, 5 figs. Study of process of lubrication in automobile engines and properties of lubricating oils in connection therewith.

Changes Due to Wear. Observations on the Causes of Change in Lubricating, and Insulating Oils During Use (Beobachtungen über die Ursachen der Veränderung der Schmier- und Isolieröle im Gebrauch). Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. F29-F30. A. W. F. report. Discusses absorption of air by oil as main difficulty, use of lubricating oil in steam turbines, Diesel engines, compressors and bearings, and mineral oil in transformers.

Classification. Practical Hints on Oils and Machinery Lubrication, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 9, Sept. 1924, pp. 129-131. Discusses qualities of good oil; some engineroom tests for oils; classification of oils; what oils to use for different services; grease and solid lubricants.

Contact Filtration. Contact Filtration Likely To Become Important Feature In Refining, W. S. Zehrung. Nat. Petroleum News, vol. 16, no. 23, June 4, 1924, pp. 27-28 and 30, 2 figs. Outlines features of process, and discusses methods of application.

Cylinder. Oils for Valve and Cylinder Lubrication, A. J. Dixon. So. Engr., vol. 41, no. 5, July 1924, pp. 60-61. Why some cylinders take polish and others do not. Selection of cylinder oils.

Deterioration. Causes of Change in Lubricating and Insulating Oils in Use (Beobachtungen über die Ursachen der Veränderung der Schmier- und Isolieröle im Gebrauch), F. Frank. Petroleum, vol. 20, no. 29, Oct. 10, 1924, pp. 1488-1493. See also Braunkohle, vol. 23, no. 29, Oct. 18, 1924, pp. 537-542. Discusses effects of oxygen on oil and formation of acids, formation of metal compounds by acids and bearing metals; treating transformer oils with ethyl alcohol.

Efficiency Measurement. Measuring the Lubricating Efficiency of Lubricating Oils (Ueber die Messung der "Schmierfähigkeit" von Schmierölen), R. von Dallwitz-Wegner. Zeit. für technische Physik, vol. 5, no. 9, 1924, pp. 378-384, 5 figs. Describes simple apparatus for measuring capacity of oils to "wet" methals, which capacity is deduced from molecular conditions expressible in numbers.

Friction of. Determination of Friction of Lubricating Oils (Zur Bestimmung der Schmiermittelreibung), R. Vieweg. Petroleum, vol. 20, no. 19, July 1, 1924, pp. 899-903, 6 figs. Discusses method which enables determination of friction losses in any bearings with any lubricant on basis of measurement of operating temperature and efficiency.

Investigating Method. A Novel, Simple and Universal Method for the Investigation of Lubricating Oils and Bearing Alloys, R. von Dallwitz-Wegner. Testing, vol. 1, no. 1, Jan. 1924, pp. 58-71, 8 figs. New method is said to be free from all factors of uncertainty.

Manufacture. How Oil Companies Manufacture Industrial Lubricants, W. Miller. Eng. Wld., vol. 25, no. 3, Sept. 1924, pp. 169-171, 3 figs. Modern processes of manufacturing lubricating oils; Abstract of paper read before Nat. Assn. Purchasing Agents.

Separation of Wax From Wax Distillate, L. D. Wyant. Nat. Petroleum News, vol. 16, no. 40, Oct. 1, 1924, pp. 73, 75-76, 78, and 82-83, 5 figs. Removal of paraffin from paraffin or intermediate base crudes in manufacture of lubricating oils.

The History, Manufacture and Function of Lubricating Oils, W. Miller. Oil Trade, vol. 15, nos. 9 and 11, Sept. and Nov. 1924, pp. 28-29, and 58 and 60, 7 figs. Sept.: Earliest lubricating use of petroleum; manufacturing and refining. Nov.: Distilling at low temperatures; removal of wax; use of agitator; chemical treatment.

Purification. Conservation, Upkeep, and Purification of Lubricating Oils (Conservation, manutention et purification des huiles de graissage principes généraux et méthodes modernes), J. Lévy. Technique Moderne, vol. 16, no. 13, July 1, 1924, pp. 453-460, 14 figs. Discusses storage, purification of used oils, nature and origin of impurities, filters, centrifugal separation, etc.

Purification of Marine Turbine and Diesel Engine Lubricating Oils. Am. Mar. Engr., vol. 19, no. 7, July 1924, pp. 11-13, 4 figs. In marine turbines and Diesel engines it is almost universal practice to reuse lubricating oil by means of circulation system; discusses batch and continuous systems of purification.

Purifiers. A New Centrifugal Oil Purifier. Elec. Rev., vol. 94, no. 2410, Feb. 1, 1924, pp. 174-175, 5 figs. Describes Empson machine designed to carry out processes of washing dirty hydrocarbon oils with water and afterward dehydrating them continuously in revolving drum.

The Centrifugal Oil Purifier. Power Engr., vol. 19, no. 219, June 1924, pp. 207-208, 2 figs. Methods and functions of centrifugal oil filters and cleaners, with particular reference to the De Laval machine.

Reclamation. A New Oil Reclaiming Process. Eng. Production, vol. 7, no. 138, Mar. 1924, p. 88, 2 figs. See also Elec. Times, vol. 65, no. 1689, Feb. 28, 1924, p. 251, 1 fig. Describes method invented by T. D. Richards, an Australian; deals with all classes and grades of dirty lubricating oils.

Reclamation of Used Lubricating Oils (Régénération des huiles de graissage usagées). Vie Technique et Industrielle, vol. 5, no. 61, Oct. 1924, pp. 457-458. Discusses filtration, decantation, and centrifuging. Notes on a French patent basing reclamation on contact electrification.

The Reclaiming of Waste Oil. Power Engr., vol. 19, no. 217, Apr. 1924, p. 138-139, 3 figs. Practice of modern steel works; use of centrifugal separator.

Refining. New Vacuum Refining Process Makes Narrow Cut Lub Oils, P. Truesdell. Nat. Petroleum News, vol. 16, no. 37, Sept. 10, 1924, pp. 64-66, 1 fig. Describes process of manufacturing lubricating oils invented by J. E. Schulze, keynote of which is vacuum distillation. Advantages claimed.

Rolling Stock. Lubricating Materials Used by the Russian Railroads. A. V. Sapožnikow. Petroleum & Oil-Shale Industry, vol. 5, no. 7-8, July-Aug. 1923, pp. 75-80. (In Russian.) See also article by A. K. Saytzeff, entitled Railway Car Oils and Lubricating Mixtures, Their Properties, Mechanical Tests, Valuation and Selection, pp. 81-92, 4 figs., with abstract in English, pp. 92-94.

Specific Heats. Specific Heats of Lubricating Oils, E. H. Leslie and J. C. Geniesse. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 582-583, 1 fig. Measurement of specific heats of six typical lubricating oils over range of temperature from 37.78 to 143.33 deg. cent.

Steam-Turbine. Characteristics of Efficient Turbine Oil, A. F. Brewer. Elec. Light & Power, vol. 2, no. 8, Aug. 1924, pp. 16-18 and 38, 2 figs. Discusses properties of oil, including viscosity, cooling ability, tendency to evaporate, fluid friction developed, demulsibility, water content, tendency to decompose, foaming and content, carbon content, sulphur and acids.

Maintaining Quality of Steam Turbine Oils in Service, C. H. Bromley. Power, vol. 59, no. 4, Jan. 22, 1924, pp. 125-128, 6 figs. Principal factors in recent development of information and equipment as related to maintaining quality of lubricating oils in use in steam turbines.

Serial Report of the Prime Movers' Committee, 1923-24, Technical National Section of National Electric Light Association. Eng. Wld., vol. 25, no. 6, Dec. 1924, pp. 393-401, 22 figs. Details of tests made on extra-light steam-turbine oils, and description of sludge accelerator; laboratory device used.

Storage and Handling. Oil Storage and Handling Practice. Elec. Ry. Jl., vol. 64, no. 3, July 19, 1924, pp. 77-79, 6 figs. Information obtained

from 57 electric railways shows that careful storage of lubricants eliminates waste, prevents contamination, minimizes fire hazard, and facilitates keeping of records; increased use of buses by railways makes necessary storage of gasoline in quantity.

Testing. Lubricating Oil Tests; How to Make Them; What They Mean, H. L. Kauffman. Nat. Petroleum News, vol. 16, nos. 37, 39, and 41, Sept. 10, 24, and Oct. 8, 1924, pp. 34 and 36; 73-74 and 79; and 63-64 and 67; 6 figs. Sept. 10: Gravity determinations; history of development of Baumé and A. P. I. scales, and a simple formula for converting specific gravity into its equivalent on the two scales; flashpoint and fire test. Sept. 24: Viscosity test; cloud, pour, and cold tests; color test; emulsification, and miscellaneous tests. Oct. 8: Carbon residue test.

Lubrication. Nat. Elec. Light Assn.—Serial Report of Prime Movers Committee, Sept. 1924, 13 pp., 22 figs. Details of field and laboratory tests covering performance of lubricating oils in steam turbines, and results obtained.

Testing Lubricating Oils (Ueber die Prüfung von Schmierölen), G. Spettmann. Praktische Maschinen-Konstrukteur, vol. 57, no. 28, July 29, 1924, pp. 399-400. Discusses importance of testing; and describes methods; chemico-physical tests for classification of oils, mechanical for determining lubricating value; temperature measurement of bearings.

Tests for Lubricating Oils. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 853-854. Details of number of tests and their comparative value.

Viscosity. Variation of Viscosity of Lubricating Oils with Temperature (Zur Temperaturabhängigkeit der Viscosität), F. König. Zeit. für angewandte Chemie, vol. 37, no. 1, Jan. 3, 1924, pp. 8-10, 1 fig. Discusses equation given by Vogel in previous issue of same journal as expressing variation of viscosity with temperature and reaches conclusion that constants employed in it cannot be determined with sufficient accuracy to render them of any value as criteria in judging commercial oils; explains how these difficulties can be overcome.

Viscosity and Surface Tension of Oils (Viskosität und Oberflächenspannung von Oelen), J. Don. Kolloid-Zeit., vol. 34, no. 5, May 1924, pp. 312-313, 1 fig. Experiments with mobile oil, rape, olive and other oils; lubricating properties.

Wear of. Cause of Chance in Lubricating and Insulating Oil in Use (Beobachtungen über die Ursachen der Veränderung der Schmier- und Isolieröle im Gebrauch), F. Frank. Praktische Maschinen-Konstrukteur, vol. 57, no. 43, Nov. 11, 1924, pp. 579-580. Discusses effect of oxygen on oil, formation of acids and secondary products of decomposition, formation of metal compounds from acids and bearing metals, etc.

LUBRICATION

Air-Compressor Cylinders. See AIR COMPRESSORS, Cylinder Lubrication; High-Speed.

Air Compressors. See AIR COMPRESSORS, Lubrication.

Automobile Chassis. See AUTOMOBILES, Chassis Lubrication.

Automobile Engines. See AUTOMOBILE ENGINES, Lubrication.

Automobiles. See AUTOMOBILES, Lubrication.

Bearings. See BEARINGS, Lubrication.

Boundary. Boundary Lubrication, Rob. W. A. Brewer. Iron Age, vol. 113, no. 6, Feb. 7, 1924, pp. 447-448, 7 figs. Being separation of metallic surfaces by an oily film of microscopic thickness; conception of safety-valve action.

Car Axles. See CAR AXLES, Lubrication.

Centrifugal Pumps. See PUMPS, CENTRIFUGAL, Lubrication.

Chain Drives. See CHAIN DRIVE, Lubrication.

Clay-Products Machinery. Lubrication of Clay Products Machinery. Lubrication, vol. 10, no. 9, Sept. 1924, pp. 97-108, 23 figs. Discusses lubrication of brick and hollow-tile machinery and of pottery machinery.

Control. Controlling Industrial Lubrication, K. Richards. Indus. Engr., vol. 82, no. 8, Aug. 1924, pp. 368-372, 8 figs. Outlines methods that are used to control from main office lubrication and inspection of variety of miscellaneous equipment in nine widely separated bakeries, each of which would be equivalent to moderate-sized factory.

Cutting Tools. Tool Engineering, A. A. Dowd and F. W. Curtis. Am. Mach., vol. 60, no. 4, Jan. 24, 1924, pp. 135-137, 3 figs. Use and importance of cutting lubricants; proper application of cooling liquid to tool and work; lubricating milling cuts; value of lubricants in thread cutting.

Cylinder. See STEAM ENGINES, Cylinder Lubrication.

Diesel Engines. See DIESEL ENGINES, Lubricating; Pipe-Line, Lubrication of.

Economics. Economics of Lubrication—Suggestions for a Research Program, W. F. Parish. Nat. Petroleum News, vol. 16, no. 19, May 7, 1924, pp. 59-60 and 63. Deals with lubrication of steam railroads, electric roads, and farming, marine, automotive, and industrial machinery.

Increasing Economy by Using Suitable Lubricants (Die Erhöhung der Wirtschaftlichkeit durch Verwendung zweckentsprechender Schmiermittel), G. Spettmann. Wärme, vol. 47, no. 42, Oct. 17, 1924, pp. 491-493. Discusses proper choice and sufficiency of lubrication, oil-testing methods and machines, measurement of temperatures and power.

Essentials. The Essentials of Lubricating Engineering, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 68, no. 3, Sept. 1924, pp. 145-151, 9 figs. How to minimize depreciation of expensive machinery.

Gas-Works Machinery. See GAS WORKS, Lubrication.

Gears. See GEARS, Lubrication.

Internal-Combustion Engines. See INTERNAL-COMBUSTION ENGINES, Lubrication.

Journal. A Graphical Study of Journal Lubrication, H. A. S. Howarth. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 77-79 and (discussion) 79-80, 10 figs. Visualizes characteristics of oil film and pressures within it for journal completely surrounded by its bearing; influences of clearance and viscosity upon journal friction are quantitatively shown by means of chart that can readily be used for designing bearings. (Abridged.)

Journal Lubricating System. Ry. Age, vol. 76, no. 37, June 21, 1924, p. 1783, 2 figs. Describes system of journal lubrication developed by Froedtert Equipment Corpn., Milwaukee, Wis.

Roller Chain Lubrication (Die Rollenkettenschmierung), D. F. Dütting. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 12, Sept. 30, 1924, pp. 272-275, 3 figs. A new system of journal lubrication, whereby an ample supply of oil is applied to journal, thereby reducing friction and rise in temperature. Also means for preventing leakage of oil from journal boxes.

Locomotive. See LOCOMOTIVES, Axle Boxes, Lubrication of; Lubrication.

Locomotive Flanges. A Pneumatic Flange Oiler. Ry. Age, vol. 76, no. 17, Mar. 29, 1924, pp. 841-

842, 2 figs. Describes Hoofer flange oiler for lubricating locomotive and wheel flanges.

Lubricators. Lubricators and Lubricating Bearing-Surfaces. Abridgements of Specifications (Lond.), Class 12 (iii), 1924, Period 1916-20, 113 pp. Patents for inventions.

Methods of Applying Lubricating Oils (Méthodes d'application des lubrifiants liquides), J. Lévy. Technique Moderne, vol. 16, no. 3, Feb. 1, 1924, pp. 69-75, 14 figs. General principles and modern apparatus; describes different types of lubricators, including manual, semi-automatic, automatic, and mechanical; accessory and special devices.

Machinery. The Development of Automatic Lubrication. Lubrication, vol. 10, no. 4, Apr. 1924, pp. 37-48, 27 figs. A study of the various devices that have been involved.

Methods. Lubrication, E. H. Strange. Chem., Met. & Min. Soc. S. Africa—Jl., vol. 25, no. 3, Sept. 1924, pp. 48-52. Discusses friction; different methods of lubricating a bearing; notes on lubrication of steam cylinders, air compressors, dynamos and motors, mine cars, rock drills, and internal-combustion and explosion engines.

Methods for Applying Lubricants. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 560-562, 8 figs. Drop-feed method of lubrication; gravity circulation of oil; methods of purifying oil; methods of using purifiers.

Mine Cars. See MINE CARS, Lubrication.

Multiple-Feed High-Pressure. Experiences with Multiple Feed, High Pressure Lubrication, L. R. Humpton. Iron & Steel Engr., vol. 1, no. 3, Mar. 1924, pp. 127-129, 3 figs. Describes installation of lubricators in steel works and successful results.

Oil Engines. See OIL ENGINES, Heavy-Oil.

Paper Industry. See PAPER INDUSTRY, Lubrication in.

Prime Movers. Prime Movers and Their Lubrication. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 739-742, 4 figs. What oil must lubricate, method of applying lubricant, operating conditions that must be met, and determination of correct lubrication; continuous lubrication; steam turbine lubrication.

Recent Trends in the Practice of Lubricating Prime Movers, C. H. Bromley. Refrig. Eng., vol. 11, no. 5, Nov. 1924, pp. 159-164 and (discussion) 164 and 179, 8 figs. Discusses behavior of mineral lubricating oils in service, steam-turbine oils and turbine lubrication, soluble sludge, effect of heat and air on oil, reciprocating steam engines, hydraulic turbines, Diesel engines, clarification of Diesel-engine oil, and gear lubrication.

Railway Motors. The Importance of Efficient Lubrication of Railway Motors, C. Bethel. Elec. Jl., vol. 21, no. 10, Oct. 1924, pp. 467-472, 9 figs. Results of tests made to determine main factors affecting operation of waste-packed bearings; tests were conducted both in laboratory and in service.

See also BEARINGS, Railway-Motor, Lubrication of.

Railway Rolling Stock. Lubrication of Rolling Stock of the French Lines (Graissage du matériel roulant des réseaux français), A. Grison. Revue Générale des Chemins de Fer, vol. 43, no. 4, Oct. 1924, pp. 255-271, 11 figs. Discusses journal boxes and brasses, oil pads, oils, oil reclamation, etc. Table giving details of lubricating methods.

Refrigeration Compressors. See REFRIGERATING MACHINES, Compressors.

Steam Engines. See STEAM ENGINES, Cylinder Lubrication; Lubrication.

Steam-Turbine. See STEAM TURBINES, Lubrication.

Steel-Works Equipment. See STEEL WORKS, Lubrication in.

Stokers. See STOKERS, Lubrication of.

Street Cars. See STREET RAILWAYS, Car Lubrication.

Theory of. Some Notes on the Theory of Lubrication with Particular Application to the Michell Thrust and Journal Bearings, J. Ward. Inst. Mar. Engrs.—Trans., vol. 36, July 1924, pp. 141-185, 24 figs. Discusses dry, rolling, greasy and viscous friction; perfect lubrication; Michell viscometer; lubrication of parallel surfaces, inclined surfaces; flow of oil; pressure distribution; bearings, etc.

LUBRICATORS. See LUBRICATION, Lubricators.

LUMBER

Handling. Lumber Handling in an Automobile Body Plant, B. Nagelvoort and T. D. Perry. Automotive Manufacturer, vol. 66, no. 4, July 1924, pp. 7-9 and 26, 6 figs. Efficient and economical handling, storing, drying and cutting of lumber; equipment for handling it; methods followed; lumber lifts and stackers.

See also AUTOMOBILE MANUFACTURING PLANTS, Materials Handling in.

Standardization. Engineering and Industrial Standardization. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 167-169. Simplified practice recommendations on lumber.

LUMBER INDUSTRY

Industrial Relations in. See INDUSTRIAL RELATIONS, Lumber Industry.

Electricity in. See ELECTRICITY, APPLICATIONS OF, Lumber Mills.

Swedish Industry. See IRON INDUSTRY, Sweden.

LYNITE. See ALUMINUM ALLOYS, Aluminum-Copper-Magnesium.

M

MACHINE DESIGN

Casting Shrinkage, Effect on. Foundry Engineering and Its Importance for the Machine Shop (Gjuteritekniken, en huvudfaktor för maskin- och verkstadsindustrien), S. Nilsson. Teknisk Tidskrift, vol. 54, no. 25, June 21, 1924, pp. 61-66 (mekanik), 14 figs. Influence of shrinkage of castings on machine design is illustrated by number of typical examples.

Feeding Devices. Feeding Devices for Automatic Machinery, A. A. Dowd. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 295-298, 6 figs. Examples of different designs of feeding devices.

Kinematic Study of Mechanisms. The Systematic Use of Bright Colors in the Study of Drives and Mechanisms (Die systematische Anwendung bunter Farben in der Getriebelehre), Hundhausen. Maschinenbau, vol. 3, no. 11, Mar. 13, 1924, pp. 355-356, 13 figs. on supp. plate. Discusses method employed successfully for many years by author, of using bright colors in order to distinguish different parts of a mechanism from one another

or the separate groups from an assembled set; includes kinematic instruction sheet, showing use of colors.

Materials, Relation to. Relation of Materials to Machine Design, Jos. K. Wood. Am. Mach., vol. 61, no. 26, Dec. 25, 1924, pp. 985-988. Points out that material specification is tie between producer and consumer; technical and commercial factors affecting selection of materials; kinds of materials to be used for machine parts.

Progress in. The Trend of Machine Design. Mech. Wld., vol. 76, nos. 1962, 1965, 1967, 1972, 1974, 1977, 1979, 1981, and 1982, Aug. 8, 28, Sept. 12, Oct. 17, 31, Nov. 21, Dec. 5, 19, and 26, 1924, pp. 82-83, 130-131, 162, 242-243, 274, 322-323, 354-355, 387, and 403-404, 47 figs. Discusses geometrical forms tooled; restriction of function; abolition of countershaft; single-pulley drive; back gears; motor driving; range of speeds and feeds; retention of accuracy; protection; ball bearings; counterbalancing; lubrication; cutting tools; tool steel; cooling liquids; examples of specialization; gear cutting; broaching machines; automatic lathes; drilling machines; turret lathes; shaping machines; etc.

Self-Centering Devices. Self-centering Devices, A. Perham. Machy. (Lond.), vol. 23, no. 593, Feb. 7, 1924, pp. 625-627, 1 fig. Term self-centering is used to describe devices in which displacement, and recovery, can be effected in each direction of movement; describes some of more usual and elementary forms of self-centering mechanism, and useful forms that are less generally known.

MACHINE GUNS

Relining Barrels. See ELECTROPLATING, Machine-Gun Barrels, Relining.

MACHINE SHOPS

[See also AUTOMOBILE MANUFACTURING PLANTS; RAILWAY REPAIR SHOPS; RAILWAY SHOPS.]

Apprenticeship Problem. Filling the Ranks of Machinists, J. C. Spence. Am. Mach., vol. 60, no. 13, Mar. 27, 1924, pp. 473-474. Discussion of seriousness of apprenticeship problem in the shop.

Construction. Steel Machine-Shop Construction (Eiserne Werkstattbauten), H. Gruetz. Bauingenieur, vol. 5, no. 14, July 31, 1924, pp. 430-435, 12 figs. Discusses modern machine-shop construction, consideration of largely increased dimensions, roof construction, light conditions, and quotes various examples of internal arrangement.

Conversion from Armament Works. Activities of Former Armament Works, F. A. Brackmann. Iron Age, vol. 113, no. 16, Apr. 17, 1924, pp. 1151-1153, 7 figs. Conversion of German government works at Haselhorst and Spandau into iron and engineering works.

Cost Estimating. How to Estimate Machine Shop Costs, A. A. Dowd. Serial article in Am. Mach., vols. 60, and 61, beginning Apr. 17, and ending Dec. 25, 1924, Apr. 17: Value of accurate estimates; organization and operation of estimating department. Apr. 24: Determination of machining time and total estimate for simple parts; reference sheets for machine tools. May 8: Shop conditions which affect cost estimate; coöperation between shop and estimating department. May 22: Classification for production estimates; machine-tool builder's estimate; estimates for contract and manufacturing work. May 29: Methods for making preliminary sketches of operation layouts; good and bad examples of layout sketching. June 12: Determination of machining time for estimate; calculation of machine speeds; selection of feeds. June 26: Methods used for estimating machining time. July 10: Speeds and feeds for various cutting tools and method for calculating time required for milling cuts. July 24: Procedure and calculations necessary to determine time required for hand-milling and hand-profiling operations. Aug. 7: How to estimate machining time for spline milling, gear milling, and gear-hobbing operations. Aug. 21: Estimates for gear cutting; thread work. Sept. 18: Estimating procedure for thread milling, hobbing and tapping operations. Oct. 16: Labor-time estimates for planing work; determining factors in planning work; complete estimates for job. Oct. 30: Examples of planing estimates. Nov. 13: Making time estimates for shaping operations in production work. Nov. 27: Time estimates for heavy-production milling work; horizontal-boring-machine operations. Dec. 25: Making time estimates for production grinding work; plain cylindrical grinding; surface grinding.

Cost Reduction. Reducing Shop Cost in the Engineering Department, J. A. Davis. Am. Mach., vol. 61, no. 20, Nov. 13, 1924, pp. 761-763, 8 figs. Reducing quantity and variety of tools and fixtures; modifying design without detriment to product; avoiding close tolerances where they are unnecessary.

Drafting-Room Management. A Practical Drafting-room System, I. B. Black. Machy. (N. Y.), vol. 30, nos. 8 and 9, Apr. and May 1924, pp. 605-607 and 671-673, 9 figs. Description of methods successfully applied in management of a drafting room.

Equipment. American Machinist Shop Equipment Review. Am. Mach., vol. 61, no. 3, July 17, 1924, pp. 89-131, 238 figs. Semi-annual résumé of machines, tools, and accessories described in Shop Equipment News section of Am. Mach. during first six months of 1924.

Fire-Department. Efficiency in the Fire Department Machine Shop, J. C. Moran. Fire & Water Eng., vol. 76, no. 3, July 16, 1924, pp. 107-108, 112, 135-136, 7 figs. Methods which make Hartford shop model; personnel and equipment; importance of good location for building. Abstract of paper read before New England Assn. Fire Chiefs.

Floating. See WARSHIPS, Floating Repair Ship.

Ford Motor Co., Canada. New Machine Shop for Ford Motor Co. Can. Engr., vol. 46, no. 7, Feb. 12, 1924, pp. 223-225, 3 figs. Covers 15 acres and is 1088 ft. by 570 ft. wide; a one-story sawtooth monitor type of building with a clear height under trusses of 14 ft. and with two longitudinal and one cross craneways.

French. The French Machine Shop, N. Lee. Am. Mach., vol. 61, no. 19, Nov. 6, 1924, p. 730. Differs little from American; limit gages fairly common; no claw hammers in carpenter shop.

Jobbing Work. Job Work Manufacturing Problems, E. W. Leach and J. T. Koch. Am. Mach., vol. 61, no. 11, Sept. 11, 1924, pp. 411-413. Discussion of factors to be considered in establishment of a jobbing department in a machinery plant.

Labor-Saving Devices. It Pays to Make the Job Easy for the Workman, L. C. Morrow. Am. Mach., vol. 61, no. 1, July 3, 1924, pp. 11-16, 18 figs. Increasing production by decreasing requirements for manual effort. Brief descriptions of some work-saving devices. Emphasizes principle of making smallest number of pieces serve greatest variety of uses.

Lighting. See LIGHTING, Machine Shops.

Locomotive Cylinder Shop. A Modern Locomotive Cylinder Shop, E. A. Custer. Baldwin Locomotives, vol. 3, no. 2, Oct. 1924, pp. 45-53, 10 figs. Describes method of machining locomotive cylinders; gives design and equipment of

plant of Baldwin Locomotive Works, Eddystone plant.

Lost Time, Causes and Correction of. How You Can Find Lost Time, L. M. Francis. Am. Mach., vol. 60, no. 13, Mar. 27, 1924, pp. 475-477, 5 figs. Study of causes of lost time in shop and methods for investigation and removal of these causes as used by a large automobile plant.

Materials Handling in. See MATERIALS HANDLING, Machine Shops.

Measurements. See MEASUREMENTS, Machine-Shop.

Measuring Instruments for. See MEASURING INSTRUMENTS, Machine-Shop.

Methods Used in. See MACHINING METHODS.

Organization. See INDUSTRIAL ORGANIZATION, Machine Shops.

Progress. Six Months in the Machine Shop Field. Am. Mach., vol. 61, no. 3, July 17, 1924, pp. 81-87. A review, in seven articles, of progress made during first half of 1924 in machinery field, railroad field, automotive industry, electric power and manufacturing industries, distribution of materials and supplies, and in exporting.

Repairs Handling. A Simple and Economical Method of Handling Repairs, F. H. Colvin. Am. Mach., vol. 61, no. 5, July 31, 1924, pp. 189-190, 3 figs. Plan, worked out by Gould & Eberhardt, Newark, N. J., which cuts out much of the paper work and overhead expense in repair work.

Signaling System. Signals in the Shop to Speed Production, C. J. Priebe. **Am. Mach., vol. 61, no.** 19, Nov. 6, 1924, pp. 731-734, 6 figs. How workman calls foreman, inspector or dispatcher; plan is part of production-control system, and is said to save time and keep materials moving properly.

Steel-Frame One-Story. Details of a Modern Steel Frame One-Story Shop. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 456-459, 7 figs. New plant of Sullivan Machy. Co., Michigan City, Ind., has specially fitted sawtooth roof and crane runways carried by main columns and jack columns; transfer table economizes yard space.

Sullivan Machy. Co. Planned for Expansion in Three Directions, G. L. Lacher. Iron Age, vol. 113, no. 2, Jan. 10, 1924, pp. 141-146, 9 figs. New plant of Sullivan Machy. Co. at Michigan City, Ind., anticipates future growth; layout and equipment show careful attention to manufacturing details.

MACHINE-TOOL INDUSTRY

Europe. Machine Tool Situation in Europe, W. R. Rastall. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 987-988. See also Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 261-262. Position of American manufacturer of machine tools in markets of Europe; question of representation.

Export Problem, U. S. The Export Problem of the Machine-Tool Industry, W. H. Rastall. Mach. Eng., vol. 46, no. 4, Apr. 1924, pp. 184-185 and 205, 1 fig. Effect of war on export trade; changes in trend of U. S. machinery exports during recent years; competition to be expected from British sources.

Great Britain. Survey of British Machine Tool Industry, Johnstone-Taylor. Iron Age, vol. 113, no. 11, Mar. 13, 1924, pp. 799-800. Builders concentrate on either light or heavy tools; changes in last ten years; surplus of automatics; status of other tools.

MACHINE TOOLS

[See also names of tools, as LATHES; PLANERS; etc.]

Attachments for. Attachments for Standard Machines, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 711-712, 4 figs. Important points in design; types of flexible designs.

Automatic Machines. Designing Automatic Machines, A. A. Dowd. Machy. (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 212-215, 5 figs. Procedure in design, and use of simple models for analyzing problems encountered.

Automobile Shops. High-Production Machines in the Automobile Shops. Am. Mach., vol. 61, nos. 5 and 7, July 31 and Aug. 14, 1924, pp. 191-194 and 277-279, 16 figs. July 31: "Simplimatic" lathe. Aug. 14: M.-G. production unit made by Meldrum-Gabrielson Corpn., Syracuse, N. Y.

The Automotive Industry and the Machine Tool Builder. Machy. (N. Y.), vol. 31, nos. 2, 3, and 4, Oct., Nov., and Dec., 1924, pp. 85-91, 179-183 and 263-267. See also Machy. (Lond.), vol. 25, nos. 627, 635 and 639, Oct. 2, Nov. 27 and Dec. 25, 1924, pp. 1-6, 265-268 and 399-402. Opinions of automotive-plant production managers and equipment engineers on machine-tool equipment for production work, also views of leading machine-tool builders.

Automotive Industry, Influence of. How the Automotive Industry Has Influenced the Design of Machine Tools, A. L. De Leeuw. Am. Mach., vol. 61, no. 23, Dec. 4, 1924, pp. 891-892. Pre-automobile influences, such as steam engine, interchangeability, high-speed steel and electric motor; effects brought about directly by automotive industry.

Ball-Bearing. See BEARINGS, BALL, Machine Tools.

Boiler-Shop. Machine Tools in the Boiler Shop. Eng. Production, vol. 7, nos. 138 and 139, Mar. and Apr. 1924, pp. 84-87 and 112-118, 32 figs. Detailed review of some modern equipment.

Boring Mills. See BORING MILLS.

British Design. British Machine-Tool Design, W. E. Sykes. Mech. Eng., vol. 46, no. 7, July 1924, pp. 395-401, 21 figs. Present status as shown by examples representative of current practice.

British Empire Exhibition. British Empire Exhibition: Machine Tools. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 694-698, 5 figs. Exhibits of W. G. Armstrong, Whitworth & Co.; Vickers; and Fred. Town & Sons of Halifax.

Machine Tools. Engineering, vol. 117, no. 3043, Apr. 24, 1924, pp. 553-554, 7 figs. Exhibits of lathes, gear-shaping machines, woodworking machinery, etc., at Brit. Empire Exhibition.

Machine Tools at the British Empire Exhibition, I. W. Chubb. Am. Mach., vol. 61, no. 5, July 31, 1924, pp. 177-179, 4 figs. Types and performances of British machine tools at Wembley.

Machine Tools at Wembley. Mech. Wld., vol. 76, nos. 1957 and 1959, July 4 and 18, 1924, pp. 2-4 and 34-36, 14 figs. Details of wheel and axle lathes, electric drives, tool equipment; broaching machines, gear-shaping machines by Vickers, Ltd.; stamping presses, including single-action press with adjustable cam brake by Taylor & Challen Ltd.

The British Empire Exhibition. Machy. (Lond.), vol. 24, no. 608, May 22, 1924, pp. 241-250, 17 figs. Machine tools and mechanical equipment.

The Machine Tool Exhibition. Eng. Production, vol. 7, no. 144, Sept. 1924, pp. 257-267, 24 figs. Describes and illustrates important exhibits; high-speed side-planing machine, girder radial drilling machine, vertical drilling machine, high-power universal milling machine, turret lathe with covered bed, slot milling machine, bench drill, etc.

Chain Drive for. See CHAIN DRIVE, Silent.

Chucking Machines. See CHUCKING MACHINES.

Combination Metal-Cutting Machine. A Combination Type of Metal-cutting Machine, S. A. Asquith. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 844-846, 8 figs. Universal machine especially adapted for reproducing various designs from enlarged patterns or drawings, either by punching, profiling, routing, milling, or engraving.

Cone-Pulley Drives. The Design of Cone Pulley Drives, S. Odegaard. Am. Mach., vol. 60, no. 7, Feb. 14, 1924, pp. 245-247, 1 fig. Useful tables for quick computation; design of back gearing; belt width and horsepower; design of drive for 24-in. lathe as example.

Defects in. Some Suggestions for Builders and Users of Machine Tools, Thos. Nadin. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 134-135. Points out simple and obvious defects in many present-day production machine tools and offers constructive suggestions for their elimination.

Demand Forecast. Forecasting Demand for Industrial Equipment, E. F. DuBrul. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 539-542, 5 figs. Business cycle in machine-tool industry. Cooperative study of stabilization. Machine-tool barometer.

Design. Methods of Machine Tool Design, A. L. DeLeeuw. Am. Mach., vol. 61, nos. 8, 9, 11, 13, 15, 17, 21 and 25, Aug. 21, 28, Sept. 11, 25, Oct. 9, 23, Nov. 20 and Dec. 18, 1924, pp. 317-320, 341-343, 431-433, 507-509, 575-578, 649-652, 799-801 and 947-949, 40 figs. Aug. 21: Feeds of intermittent type. Aug. 28: Design of feed drive and gearing for planers, and devices for feed variation and rapid traverse. Sept. 11: Design of combined intermittent feed and rapid traverse mechanism. Sept. 25: Factors affecting design of frame units for machine tools. Oct. 4: Necessity of seasoning of castings, resistance to bending and torsion. Oct. 23: Machine framework as support for slide ways; wear of sliding surfaces under various conditions. Nov. 20: Lubrication for slide ways and heavy machines; oil pressures for forced lubrication; bearing-surface proportions. Dec. 18: Problems in design of guides for machine tools; lathe-bed construction and proportions.

Development, New England. Development of Machine Tools in New England, G. Hubbard. Am. Mach., vol. 60, nos. 4, 5, 6, 7, 8, 12, 17, 24 and 26, Jan. 24, 31, Feb. 7, 14, 21, Mar. 20, Apr. 24, June 12 and 26, 1924, pp. 129-132, 171-173, 205-209, 255-258, 271-274, 437-441, 617-620, 875-878 and 951-954, 70 figs., and vol. 61, nos. 2, 5, 7, 8, and 12, July 10, 31, Aug. 14, 21, and Sept. 18, 1924, pp. 65-68, 195-198, 269-272, 313-316, and 453-455, 9 figs. Jan. 24: American exhibit at Crystal Palace; famous Enfield (England) Armory equipped with machinery and tools from New England; gages sent from England made of wood. Jan. 31: Hartford plant of Robbins & Lawrence turns out world-famous products and finally becomes part of Pratt & Whitney plant. Feb. 7: Windsor machine tools still in use; development of drilling machine. Feb. 14: Examples of early milling machines; first universal milling machine; edging or profiling machine. Feb. 21: Lathes and swiveling headstocks; tailstocks with square spindles; an early bolt-threading machine; evolution of turret lathe. Mar. 20: Officers of Robbins & Lawrence Co.; New England mechanics who have become famous. June 12: Drawings of machine tools in colors; interchangeable work at Harper's Ferry. June 26: Circumstances that led to formation of Jones & Lamson Machine Co. July 10: History of flat turret and lo-swing lathes; development of Fellows gear shaper and Bryant chucking grinder. July 31: Organization and activities of Windsor Machine Co. Aug. 14: Invention of Gridley automatic turret-lathe; machines for turning pistons and eccentric piston-rings. Aug. 21: Genesis of automatic screw machine. Sept. 18: Formation of Nat. Acme Co.

Developments. Fourth New Haven Machine-Tool Exhibition. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 698-700. Review of papers and discussion in connection with exhibition conducted under auspices of A. S. M. E. New Haven Section, Yale University, and New Haven Chamber of Commerce.

Differential Gearing for. See GEARS, Differential.

Early Forms and Progress. The Master Tools of Industry, D. S. Kimball. Am. Mach., vol. 60, nos. 19 and 20, May 1 and 15, 1924, pp. 679-683 and 723-727, 27 figs. Early attempt of man to supplement his bodily efforts; principle of transfer of skill; modern machines and transfer of thought. Henry Maudsley and his enduring contribution to lathe design; beginnings of interchangeable manufacture; semi-automatic machine; Spencer and full automatic machine.

Electric Drive. See ELECTRIC DRIVE, Machine Tools.

Electric Equipment. Electrical Equipment for Machine Tools, J. W. Harper. Am. Mach., vol. 61, no. 6 and 7, Aug. 7 and 14, 1924, pp. 215-217 and 261-264, 11 figs. General features; characteristics of various types of motor controllers; duty each type is best fitted to perform; undervoltage protection; magnetic or push-button control. Devices giving protection from overload, types of winding.

Electrically Driven. Reglo Machine Tools (Reglo-Werkzeugmaschinen), O. Pollak. Werkstattstechnik, vol. 18, nos. 2 and 3, Jan. 15, and Feb. 1, 1924, pp. 21-28 and 53-57, 27 figs. Describes electric machine-tool drives of German Gen. Elec. Co. which form integral but interchangeable part of machine, so that such a machine works as whole unit in same way as turbo-generator, electric winding engine, etc.; numerous examples are described and illustrated.

Electrification of. The Electrification of Machine Tools, L. W. Scott Alter. South. & Southwest. Ry. Club, vol. 17, no. 6, Nov. 1923, 21 pp., 39 figs. Suggestions that may be applied to local conditions, including selection of different equipment and operating data.

Feet and Bases. Design of Machine Tool Feet and Bases, F. Horner. Machy. (N. Y.), vol. 30, nos. 6 and 7, Feb. and Mar. 1924, pp. 450-453 and 508-510, 12 figs. Typical designs for different classes of machines.

Gears for. See GEARS, Micarta Silent.

German. New Machines and Tools Exhibited at the Leipzig Fair (Neue Maschinen und Werkzeuge). Werkstattstechnik, vol. 18, nos. 4 and 5, Feb. 15 and Mar. 1, 1924, pp. 98-110 and 141-156, 104 figs. Feb. 15: Describes method of accurate production of dividing wheels for gear-cutting machines; gear-cutting machines; automatic gear-cutting lathes; planing machines; automatic and turret lathes; saws; microscope for workshop measurements; etc. Mar. 1: Device for cutting bevel gears; Lauf-Thoma gears for machine tools; grinding machines; shaping and slotting machines; milling machines; woodworking machines; etc.

Possibilities of Developing German Cutting Machine Tools (In welcher Richtung liegen die Entwicklungsmöglichkeiten der deutschen spanabhebenden Werkzeugmaschinen und welche Faktoren sind hierfür ausschlaggebend?), Huhn. Maschinenbau, vol. 3, no. 25, Oct. 9, 1924, pp. 947-951. Importance of high-speed steel and use

of recent rotary steels; electric individual drives; universal and special machines.

Progress in the Working of Metals, with Special Reference to the Leipzig Spring Fair (Fortschritte der Metallbearbeitungstechnik unter Berücksichtigung der Leipziger Frühjahrsmesse), M. Buxbaum. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 29 and 31, July 19 and Aug. 2, 1924, pp. 745-750 and 798-802, 27 figs. Reviews most important improvements in working metals, machine tools and tools industry, covering lathes, drilling and molding machines, planers, etc., grinding machines, circular and surface, grinding wheels, saws, files, hammers, etc.

The Machine-Tool Exhibition of the Society of German Machine-Tool Builders at the Leipzig Technical Fair 1924 (Die Werkzeugmaschinenausstellung des Vereines Deutscher Werkzeugmaschinenfabriken auf der Leipziger Technischen Messe 1924), O. Rambuscheck. Maschinenbau, vol. 3, no. 10, Feb. 28, 1924, pp. 269-299, 116 figs. Describes tools and machine tools for metal and wood working. See also article by H. Pfennig, entitled New Machine Tools (Neue Werkzeugmaschinen), pp. 300-301, 4 figs., describing three new machines exhibited at show, namely, a turret lathe, grinding machine and automatic milling machine.

High-Production. See Automobile Shops.

Hydraulic Drive. See HYDRAULIC DRIVE.

Improvements. Trend of Improvements in Machine Tools, L. D. Burlingame. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 30-32, 1 fig. Ease of operation and better speed and feed ranges are features; replacing obsolete equipment profitable; need for training skilled workers.

Interlocking Devices. Interlocking Devices, Al. Clegg. Machy. (N. Y.), vol. 30, nos. 6, 7, and 8, Feb., Mar., and Apr. 1924, pp. 446-447, 526-528, and 614-616, 11 figs. Describes different types. Feb.: Two-lever and single-lever devices; an automatic device. Mar.: Device for lathe apron; an inexpensive mechanism. Apr.: Device for a geared drive; arrangement for back gears; device for elevating mechanism.

Leipzig Fair. Machine Tools Displayed at Leipzig Spring Fair 1924, O. Rambuschek. Eng. Progress, vol. 5, no. 6, June 1924, pp. 101-108, 23 figs. Descriptions of outstanding exhibits.

See also German.

Magazine Attachments. Design of Magazine Attachments, A. A. Dowd. Machy. (Lond.), vol. 24, no. 620, Aug. 14, 1924, pp. 617-620, 8 figs. Magazine attachments for irregular work.

Magazine Carriers. Design of Magazine Carriers and Slides, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 931-934, 8 figs. In transferring parts from a magazine chute or hopper to cutting position in an automatic machine, a carrier or some other mechanical means is required, unless work can be fed directly by gravity. Points involved in designing a carrier; carrier supports; examples of carrier-slide design; control of carrier-slides; safety devices for slides; carriers for irregular pieces.

Magnetic Control. Electric Drive and Magnetic Control for Machine Tools, A. L. Harvey. Elec. Jl., vol. 21, no. 6, June 1924, pp. 265-269, 9 figs. Advantages of use of electric drive with magnetic control; reversing drive; suggestions in connection with operation.

New Types. Digest of New Machine Tools and Shop Equipment. Iron Trade Rev., vol. 75, no. 19, Nov. 6, 1924, pp. 1236-1243, 24 figs. Details of new equipment. Includes lists of tools described in this journal since beginning of 1924, alphabetically arranged according to manufacturers and according to products.

New Machine Tools and Shop Equipment. Iron Trade Rev., vol. 74, no. 23, June 5, 1924, pp. 1505-1513, 28 figs. Description of new machine tools and mechanisms; list of tools described thus far in this journal in 1924; phases of work being done by Nat. Machine Tool Bldrs.' Assn.

Principal Developments in Shop Equipment, L. C. Morrow. Am. Mach., vol. 60, no. 3, Jan. 17, 1924, pp. 81-111, 213 figs. Semi-annual résumé of machines, tools and accessories described in Shop Equipment News section of this journal during last six months of 1923. See also Index of Manufacturers, pp. 112-114.

Olympia Exhibition, London. British Machine Tools at the Olympia Exhibition. Engineer, vol. 138, no. 3585, Sept. 12, 1924, 16 pp. (Supp.), 47 figs. Descriptions of some of the British machine tools exhibited.

Machine Tool Trades' Exhibition 1924. British Machine Tool Eng., vol. 3, no. 29, Sept.-Oct. 1924, pp. 107-167, 74 figs. Descriptions of machine tools exhibited by Associated British Machine Tool Makers Ltd. at Olympia, London.

The Machine Tool and Engineering Exhibition, Olympia, 1924. Machy. (Lond.), vols. 24 and 25, nos. 623, 624, 625, 626, and 627, Sept. 4, 11, 18, 25, and Oct. 2, 1924, pp. 714-730, 750-768, 785-801, 819-837, and 20-25, 139 figs. Review of new machine tools and machine-tool features. See also Engineer, vol. 138, nos. 3584-3589, Sept. 5, 12, 19, 26, Oct. 3 and 10, 1924, and Engineering, vol. 118, nos. 3062-3065, Sept. 5, 12, 19 and 26, 1924.

Plate and Bar-Working. Plate and Bar-working Tools. Machy. (Lond.), vol. 23, no. 588, Jan. 3, 1924, pp. 450-454, 9 figs, and vol. 24, no. 615, July 10, 1924, pp. 467-473, 18 figs. Jan. 3: Plate edge planers; frame plate slotting and milling machines. July 10: Jib crane and outfit, pipe riveters, large boiler riveters, stay-bolt riveter, etc.

Production. Production Machine Tools. Machy. (Lond.), vol. 25, nos. 638 and 639, Dec. 18 and 25, 1924, pp. 353-366 and 389-398, 46 figs. Their application to manufacturing problems; comparison between single-purpose and standard machines; scope of production machine tools; types of machines and tooling operations. Manufacture and types of milling machines; gear-hobbing machines; grinders.

Production Service by Manufacturers. Production Service Co-operation Between Manufacturer and Machine User, F. A. Parsons. Am. Mach., vol. 61, no. 26, Dec. 25, 1924, pp. 981-983, 7 figs. Gives examples showing advantage of production service by machine-tool manufacturer; practice followed by Kearney & Trecker Corpn.

Railway Shop. Digest of New Machine Tools and Shop Equipment. Iron Trade Rev., vol. 75, no. 1, July 3, 1924, pp. 39-45, 23 figs. Descriptions of machine tools and other equipment exhibited at joint convention of Am. Ry. Assn. and Ry. Supply Mfrs.' Assn. at Atlantic City. Exhibition was intended primarily for railway shop tools and appliances, but nearly all of the machines and much of the equipment were applicable to all branches of metal-working industry.

Machine Tools for Railway Shops. Ry. Engr., vol. 45, nos. 535, 536, and 537, Aug., Sept. and Oct. 1924, pp. 279-281, 313-314, 341-344 and 350, 14 figs. Examples of new and improved types exhibited at Machine Tool & Eng. Exhibition at Olympia.

Reclaiming. Reclaiming Small Taps and Dies. Machy. (Lond.), vol. 24, no. 612, June 19, 1924, pp. 359-360, 2 figs. Tap and die grinding fixtures.

Safety Tapping Mechanisms. Mechanisms for Preventing Tap Breakage, A. Pestel Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 424-426, 6 figs. Deals with more important problems involved in designing safety tapping mechanisms, and methods suggested for overcoming difficulties

encountered with certain mechanisms developed for this work.

Setting for Short Jobs. Setting Machine Tools for Short Jobs, A. A. Dowd. Iron Age, vol. 114, no. 2, July 10, 1924, pp. 74-77, 4 figs. Examples of economical handling of work requiring lathe set-up. Savings effected by providing operator with sketches and complete data.

Ship Machinery. Heavy Machine Tools for Construction of Ship Machinery (Schwere Werkzeugmaschinen für den Schiffsmaschinenbau). Schiffbau, vol. 25, no. 10, Feb. 27, 1924, pp. 236-239, 5 figs. Describes special lathes, drilling and cutting machine, and heavy planing machine.

Special. Special Machines and Their Use in Modern Manufacture (Spezialmaschinen und ihre Verwendung in der modernen Fabrikation), G. Storz. Wirtschaftsmotor, vol. 6, no. 10, Oct. 25, 1924, pp. 7-8, 2 figs. Design and operation of multiple automobile cylinder boring machine, automatic milling cutter for producing 30 teeth for quantity production.

"Ten Cookie Cutters per Minute," K. H. Crumrine. Am. Mach., vol. 60, no. 15, Apr. 10, 1924, pp. 535-537, 5 figs. How obstacles in development of special machine for making cookie cutter were overcome; cutting irregular pieces from thin aluminum tubing; mechanism based on ordinary pipe-cutter finally successful.

Speed Charts. Alignment Charts for Speeds (Fluchtlinientafel für Drehzahlen), H. Behr. Werkstattstechnik, vol. 18, no. 11, June 1, 1924, pp. 294-296, 3 figs. Plotting of alignment chart for determination of geometrically arranged revolution numbers, magnitude of average cutting-speed drop, and of quotients of geometrical series.

Speeds and Feeds. Tool Engineering, A. A. Dowd and F. W. Curtis. Am. Mach., vol. 60, no. 9, Feb. 28, 1924, pp. 315-318. Speeds and feeds of machine tools; definition of cutting speed; relation between speed and feed; points in design affected by speeds and feeds.

Sprinkler-Head Assembly Machine. Assembling Sprinkler Heads. Machy. (Lond.), vol. 24, no. 614, July 3, 1924, pp. 427-428, 3 figs. Describes automatic machine developed by Rockwood Sprinkler Co., Worcester, for assembly of sprinkler heads used in fire-extinguisher systems, and explains construction of sprinkler head.

Standard Data Sheets. Standard Data Sheets for Machine Tool Builders and Users, A. L. Evans. Am. Mach., vol. 60, no. 11, Mar. 13, 1924, pp. 381-386, 3 figs. See also Iron Trade Rev., vol. 74, no. 23, June 5, 1924, pp. 1499-1503, 4 figs., and Abrasive Industry, vol. 5, no. 10, Oct. 1924, pp. 245-249, 3 figs. Standard data sheets devised by author in order to simplify work of planning, routing, designing, equipping tools, making time studies, changing factory layout, and similar tasks.

Standardization. Contribution to the Question of Standardization of Machine Tools (Beitrag zur Frage der Vereinheitlichung im Werkzeugmaschinenbau), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, no. 22, June 17, 1924, pp. 306-309. Discusses principal point regarding lathes and shows that even in far-reaching standardization peculiarity of construction by individual firms may be maintained.

Standardization Versus Individuality, L. D. Burlingame. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 529-530 and 538. Discusses standardization in machine-tool industry, giving a word of caution against the too eager adoption of ill-advised standards.

Tables. Work-holding Surfaces of Machine Tools, Machy. (Lond.), vol. 24, no. 605, May 1, 1924, pp. 132-137, 20 figs. Table design for different types of machines.

Tests. Acceptance Tests for Machine Tools (Abnahmekontrolle an Arbeitsmaschinen), M. Kurrein. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1032-1036, 10 figs. Discusses technical and economic bases for establishing testing stations for machine tools, using them for acceptance tests.

Testing the Performance of Machine Tools (Leistungsprüfung von Werkzeugmaschinen), W. Mitan. Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1115-1117. Discusses rules for carrying out working resistance tests and turning them to account.

Tooling of. Proper Tooling a Big Factor in Production. Can. Machy., vol. 32, no. 21, Nov. 20, 1924, pp. 21-24, 6 figs. Increasing output of reciprocating machine tools by simple devices.

Tractor Building. See AUTOMOBILE MANUFACTURING PLANTS, Machine Tools for.

United States. Present Status of American Machine-Tool Construction for Quantity and Special Production (Der heutige Stand des amerikanischen Werkzeugmaschinenbaues für Massen- und Sonderleistungen), H. D. Brasch. Maschinenbau, vol. 3, no. 25, Oct. 9, 1924, pp. 931-947, 57 figs. Requirements of machine tools for quantity production; principal American and German forms; recent types of special machines.

Universal Metal-Cutting Machine. A Combination Type of Metal-Cutting Machine. Machy. (Lond.), vol. 24, no. 617, July 24, 1924, pp. 513-515, 7 figs. Universal machine especially adapted for reproducing various designs from enlarged patterns or drawings, either by punching, profiling, routing, milling, or engraving.

Wembley Exhibition. See British Empire Exhibition.

MACHINERY

[See also MACHINE TOOLS.]

Altitude, Influence on. Influence Exerted by Altitude on Apparatus, K. Lubowsky. Elec. Wld., vol. 84, no. 3, July 19, 1924, pp. 109-110. Influence of altitude on calculations connected with all apparatus which generates, distributes or consumes energy. Correction factors for various types of apparatus; influence on heating; outputs and ratings; table for any height.

Automatic, Feeding Devices for. See MACHINE DESIGN, Feeding Devices.

Automatic, Hopper Design. Hopper Design for Automatic Machinery, A. A. Dowd. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 37-40, 6 figs. Consideration of design of types of hoppers most commonly required. Examples of hopper design.

Construction. Elements of Construction in Mechanics of Precision (Konstruktionselemente der feinmechanischen Technik), O. Richter. Maschinenbau, vol. 3, no. 20, July 24, 1924, pp. 723-726, 68 figs. Discusses desirability of precision in construction and gives examples of electric spot welding, soldering, fits, force fits, joints, rivet joints, bearings, securing bearing pins, etc.

Czechoslovakian Industry. The Cost of Nationalism in Czecho-Slovakia, H. Obermeyer and A. L. Greene. Am. Mach., vol. 60, no. 8, Feb. 21, 1924, pp. 291-294, 3 figs. Present condition of machine industry; results of economic policy of this new republic; discrimination in favor of Czech industrials; domestic field in machinery.

Design. See MACHINE DESIGN.

Fatigue Breakages in Parts. Fatigue Breakages in Machine Parts and Their Elimination by the Use of Heat-Treated Alloy Steels (Utmattningsbrott hos konstruktionsstal och deras förekommande genom användning av seghärdade specialstal), S. von Hofsten. Teknisk Tidskrift, vol. 54, no. 43½, Oct. 25, 1924, pp. 420-425 (Allmänna Avdelningen), 5 figs. Explains nature of fatigue

breakages. Alloy steels permit effective hardening and consequent strengthening of bulky machine parts. High elastic limit most important feature. Coöperation between designers and metallurgists urged.

Foundations. Fundamentals of Machinery Foundation Design and Construction, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 11, Nov. 1924, pp. 538-540, 4 figs. Hints on construction of foundations and materials to be used for this purpose.

Machinery Foundations. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 10-11. Notes on foundations for steam engines, turbo-alternators, and heavier kinds of pumping plant.

See also FOUNDATIONS, Engine.

Fractures from Freezing. Fractures from Freezing, E. Ingham. Power Eng., vol. 19, no. 225, Dec. 1924, p. 469. Notes on risks of disastrous fractures of machinery which may arise in consequence of frost; preventive measures; antifreezing solutions.

Grouping of. Grouping Machines Economically, H. M. Groff. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 583-586, 2 figs. Discusses laws that govern economical grouping of machines to be run by one operator, and describes a practical method of setting tasks on such operations; method can be applied to groups of shapers, planers, engine lathes, power milling and drilling machines, etc.

Guards for. Construction of Machinery Guards. Nat. Safety News, vol. 9, no. 1, Jan. 1924, pp. 43-53, 14 figs. Materials suitable for guard construction; machine tools needed for fabrication of guards; detailed guard features; specifications for guards; guard standards.

High-Pressure. Elements of Construction for High Pressures (Konstruktionselemente für hohe Drücke). Maschinenbau, vol. 3, no. 20, July 24, 1924, pp. 731-750. Series of articles on Significance of High Pressures in Low-Temperature Work, H. Hausen, 5 figs.; High-Pressure Steam Plants and Construction of Fittings, E. Edler, 9 figs.; Hydraulic Accumulators, Operation with, and Control of, High Pressures, O. Fahr, 1 fig.; Effect of High-Pressure Working on Pipe Lines, F. Seiffert, 15 figs.; Shaft Pipe Line, etc., E. Kaschny, 9 figs.

High-Speed Spindles. Speeding-Up Automatic Machines. Eng. Production, vol. 7, no. 143, Aug. 1924, pp. 242-243, 6 figs. Design and construction of new Brown and Sharpe high-speed spindles for speedy and efficient production of small parts in brass, aluminum, or other soft materials.

Knocks, Tracing. Tracing Knocks in Engines While Rotating, E. Prince. Mech. Wld., vol. 76, no. 1975, Nov. 7, 1924, pp. 296-297. Methods of tracing knocks of machinery in motion.

Manufacture, Size Control in. Workmanship—The New Direct System of Size Control, P. J. Darlington. Sibley Jl. of Eng., vol. 38, no. 4, Apr. 1924, pp. 92-96. Describes new microgage system of production measurement, or size control, in which precision made available by Bur. Standards, and represented in cylindrical standard, is directly transferred to part being produced by means of a new automatic measuring comparator called microgage.

Operation and Maintenance. The Operation, Management and Maintenance of Machinery, W. P. Walker. Power Engr., vol. 19, nos. 219, 220, 222, 223, and 225, June, July, Sept., Oct., and Dec. 1924, pp. 209-212, 268-271, 349-350, 390-393, and 462-463, 10 figs. Discusses principles and practice, based on author's experience.

Paper-Making. See PAPER MACHINERY.

Running, Stress Measurement in. Stress Measurements on Running Machines (Spannungsmessungen an laufenden Maschinen), J. Geiger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 11, Mar. 15, 1924, pp. 265-268, 15 figs. Describes measuring instrument for determining stresses in running machines; requirements which instrument must fulfill, and five methods of testing values obtained.

Stress in Parts. Optical Investigation of State of Stress in Machinery Parts with Sharp and with Rounded-Off Corners (Optische Untersuchung des Spannungszustandes in Maschinenteilen mit scharfen und abgerundeten Ecken), W. Birnbaum. Zeit. für technische Physik, vol. 5, no. 4, 1924, pp. 143-149, 20 figs. Apparatus consists of optical bench, upon which luminous source, polarization, load, and compensation apparatus, as well as photographic equipment, are arranged on movable slides; special investigations on turbine-blade feet and T-pieces.

Torsional Oscillations. Investigation of Oscillations Around an Axis in a Machine (Beitrag zur Untersuchung von Drehschwingungen bei Maschinen), E. v. Brauchitsch. Zeit. für Technische Physik, vol. 4, no. 11, 1923, pp. 426-430, 5 figs. New method for analytical determination of natural frequency of each of the component parts of a rotating system and for investigation of oscillations in a torsional-elastic system.

Vibrations. See VIBRATIONS, Machinery.

MACHINING METHODS

Automobile Brake Parts. Machining Parts for Four-Wheel Brakes, H. Campbell. Am. Mach., vol. 61, no. 12, Sept. 18, 1924, pp. 465-467, 9 figs. Details of machining operations on cylinders and pistons for hydraulic brakes in Timkin-Detroit axle plant.

Automobile Cylinder Blocks. Machining Buick Cylinder Blocks, J. Younger. Am. Mach., vol. 61, no. 13, Sept. 25, 1924, pp. 503-505, 10 figs. Methods used in shops of Buick Motor Car Co.

Automobile-Engine Parts. Pierce-Arrow Machining Processes, J. Younger. Am. Mach., vol. 61, no. 15, Oct. 9, 1924, pp. 571-573, 10 figs. Account of major operations on latest product of Pierce-Arrow plant, the model 80 car.

See also AUTOMOBILE ENGINES, Machining Parts.

Automobile Parts. See AUTOMOBILE MANUFACTURING PLANTS.

Bearings. Special Tools Facilitate Machining of Bearings. Elec. Ry. Jl., vol. 64, no. 20, Nov. 15, 1924, pp. 834-837, 8 figs. Special tools employed by Twin City Rapid Transit Co. in machining of axle and armature bearings.

Blue Prints, Elimination of. Eliminating Blue Prints in Machining. Iron Age, vol. 114, no. 21, Nov. 20, 1924, pp. 1327-1328, 4 figs. Jigs registering from machined surface are used for tool setting; "greased air" employed in deep-hole drilling; practice at Snow-Holley Works, Buffalo, of Worthington Pump & Machy. Corpn.

Eccentrics, Turning of. Tools and Fixtures for Turning Eccentrics, F. H. Mayoh. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 976-979, 11 figs. Points out methods to be used in machining eccentric parts under different conditions.

Economical. Analysis of a Machine-Shop Problem on a Quantity and Final-Economy Basis, A. L. De Leeuw. Mech. Eng., vol. 46, no. 6, June 1924, pp. 335-338 and 362, 1 fig., and (discussion) no. 8, Aug. 1924, pp. 480-481. Discusses nature of analysis which should be followed in determining most economical method of machining work, either in large or small quantities; deals only with items relating to actual machining processes; particular attention is called to difference between saving of labor cost and ultimate economy; as example some of operations on automobile connecting rod are taken. (Abridged.)

Interchangeable Manufacture. See INTERCHANGEABLE MANUFACTURE.

Locomotive Cylinders. New York Central Cylinders, L. C. Morrow. Am. Mach., vol. 61, no. 13, Sept. 25, 1924, pp. 493-494, 4 figs. Operation sequence and methods at West Albany shops of New York Central valuable for comparative purposes.

Rifle Manufacture. See RIFLES, Bolt Manufacture.

Shouldered Work. Accuracy in Machining Shouldered Work, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 590-591, 3 figs. Method of obtaining accurate shoulder distances with turret lathe. Accurate facing on a drill press.

Side- and Main-Rod Work. Side and Main Rod Work, L. C. Morrow. Am. Mach., vol. 61, no. 10, Sept. 4, 1924, pp. 367-369, 5 figs. Methods of West Albany shops of New York Central R. R. with description of an air-operated fixture used in machining rod brasses.

Single Pieces, Machining of. Economical Machining of Single Pieces, A. A. Dowd. Iron Age, vol. 113, no. 14, Apr. 3, 1924, pp. 989-991, 4 figs. Causes of loss in setting up machine tools for repair or replacement jobs; handling of work by planning department advantageous.

Tool-Slippage Prevention. Prevention of Tool Slippage in Machine Work, F. Horner. Can. Machy., vol. 32, no. 32, no. 19, Nov. 6, 1924, pp. 30-33 and 52, 29 figs. Various methods of holding work to ensure accuracy.

Tooling for Small-Quantity Work. Tooling for Small Quantity Work, L. S. Love. Iron Age, vol. 114, no. 19, Nov. 6, 1924, pp. 1193-1196, 11 figs. Jobs not calling for bulk production put through on semi-production basis; savings accomplished by grouping operations. Practice at Schenectady works of Gen. Elec. Co.

Vertical-Oil-Engine Parts. Building Vertical Oil Engines. Machy. (Lond.), vol. 24, no. 621, Aug. 21, 1924, pp. 665-669, 13 figs. Describes machining of crankshafts, cylinder frames and cylinder head, operations on liners, connecting rod and piston, etc.

MACROGRAPHY

Metal. See METALS, Macrography.

MAGNESITE

Austrian Works. The Veitsch Magnesite Works (Veitscher Magnesitwerke). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 247-248, 2 figs. Describes four plants of Veitsch Magnesite Works Corpn., the Veitsch, Breitenau and Eichberg plants, with total production of 170,000 tons sinter magnesite and magnesite brick.

Deposits. Types of Magnesite Deposits and Their Origin, G. W. Bain. Economic Geology, vol. 19, no. 5, Aug. 1924, pp. 412-433. Discusses properties, preparation and uses of magnesite, types of magnesite deposits, composition; magnesite as sedimentary rock, alteration of serpentine, vein filling, replacement of limestone.

Sources and Trade. Magnesite: Commercial Sources and Trade, C. G. Yale, R. O. Hall and E. Baldwin. Trade Information Bul. (Supp. to Commerce Reports), no. 184, Feb. 4, 1924, 19 pp. Data on industry of the different countries.

MAGNESIUM

Foundry Practice. Explains Use of Magnesium, H. J. Maybrey. Foundry, vol. 52, no. 3, Feb. 1, 1924, pp. 96-99, 3 figs. Peculiarities of metal which readily can be handled by foundryman are pointed out; features of molding and design, and means of avoiding defective castings.

Production. Magnesium. Chem. & Met. Eng., vol. 31, no. 10, Sept. 8, 1924, pp. 383-386, 2 figs. Mechanical properties of pure magnesium and of magnesium-aluminum alloys; new American process for producing magnesium; difficulties of casting, forging, and welding, etc.; New methods of producing this metal are rapidly changing its industrial status, especially as a material of construction.

Reagent for Precipitation. Metallic Magnesium as a Qualitative and Quantitative Reagent in Inorganic Analysis (Die Anwendung metallischen Magnesiums als qualitatives und quantitatives Reagens in der anorganischen Analyse), G. P. Pamfil. Zeit. für anorganische u. allgemeine Chemie, vol. 133, no. 2-3, Feb. 19, 1924, pp. 265-266. Magnesium is said to be suitable reagent for precipitation of various heavy metals.

Specific Heat. See METALS, Specific Heats.

U. S. A. Magnesium and Its Compounds in 1923, J. M. Hill and G. F. Loughlin. U. S. Geol. Survey, no. II: 2, July 28, 1924, pp. 7-21. Statistics of production of magnesium, dolomite, magnesium chloride and sulphate, metallic magnesium by states.

MAGNESIUM ALLOYS

[See also ALLOYS, Light.]

Electron. Magnesium Alloy a Substitute for Aluminum. Can. Foundryman, vol. 15, no. 5, May 1924, pp. 26-27 and 36. Mixed with small proportion of zinc this metal produces an alloy, called Electron, of low specific gravity and high tensile strength; easily ignited its greatest drawback.

See also MAGNESIUM, Production.

MAGNETIC ANALYSIS

Elements. The Elements of Magnetic Analysis, E. H. Crapper. Engineering, vol. 117, nos. 3041, 3045, 3047, 3051, and 3052, Apr. 11, May 9, 23, June 20 and 27, 1924, pp. 452-454, 601-602, 660-662, 786-788, and 816-817, 21 figs. Points out that no complete system of magnetic analysis has yet been evolved and put into practice; magnetic constants of magnet which require consideration are divided into two groups, according as they refer (1) to nature of material used, and (2) to working qualities or properties of magneto-magnets; these constants are obtained directly by experiment, or derived from experimental results obtained.

MAGNETIC FIELD

Alternating, Ferromagnetic Constants for. Ferromagnetic Constants for Weak Alternating Magnetic Fields (Die ferromagnetischen Konstanten für schwache Wechselfelder), H. Jordan. Elektrische Nachrichten-Technik, vol. 1, no. 1, July 1924, pp. 7-29, 10 figs. Shows that in case of weak alternating magnetic fields properties of various materials can be defined by a small number of constants which are determined by means of a few measurements.

Earth's. See EARTH, Magnetic Field.

Electrical Machinery. Magnetic Fields of Variable Speed of Motion (Ueber Magnetfelder mit veränderlicher Bewegungsgeschwindigkeit), N. Japolsky. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 106-128, 12 figs. Discusses increasing output of electric machines by not keeping constant velocity of driving magnetic field but always varying it in correspondence with velocity changes of movable parts.

Iron, Behavior in. See IRON, Behavior in High-Frequency Fields.

Mapping. A Method for Mapping Magnetic Vector Fields, P. Kirkpatrick. Optical Soc. Am. —Jl., vol. 9, no. 5, Nov. 1924, pp. 617-621, 3 figs. Describes method which permits determination through one series of operations of direction and magnitude of magnetic field vector.

Measurement. The Measurement of the Horizontal Intensity of the Earth Magnetic Field with Portable Electric Magnetometers, N. Watanabe and T. Kawamura. Japanese Jl. Astronomy & Geophysics, vol. 1, no. 6, 1924, pp. 191-206, 10 figs. Details of construction and operation of magnetometer used in magnetic survey of Japan, including theodolite, mirror magnetometer, vibration magnet and deflection bar, coil, standard for current, and accessories.

Strong, Method of Production. A Method of Producing Strong Magnetic Fields, P. L. Kapitza. Roy. Soc.—Proc., vol. 105, no. A734, June 2, 1924, pp. 691-710, 11 figs. Possibility of obtaining strong magnetic fields for a small fraction of a second. Describes an accumulator which gives a power of the order of 1000 kw. for a small fraction of a second, and timed switches for making and interrupting strong currents up to 12,000 amperes. Account of a high-frequency oscillograph (20,000 to 30,000 per sec.) for measuring strong currents occurring during a small fraction of a second. Construction and measurement of magnetic constant of coils for producing magnetic fields. Account of experiments in obtaining strong fields.

Transverse. Effect of a Transverse Magnetic Field at the Cathode of a Dim Discharge (Die Wirkung eines transversalen Magnetfeldes an der Kathode der Glimmentladung), A. Günther-Schulze. Zeit. für Physik, vol. 24, no. 2, May 22, 1924, pp. 140-147, 4 figs. Determination of normal current desity at mercury cathode in H_2, N_2, Ar, Hg, H_2O gases depending on strength of transverse magnetic field.

MAGNETISM

Calculation. Calculation of Magnetic Attraction by Means of a Spectrum (Calcul de l'attraction magnétique à l'aide d'un spectre), T. Lehmann. Revue Générale de l'Electricité, vol. 16, nos. 2 and 3, July 12 and 19, 1924, pp. 51-58 and 99-103, 15 figs. Shows that magnetic attraction may be found directly from spectral lines without field components.

Ferro- and Para-. Ferromagnetism and Paramagnetism (Ferro-magnétisme et paramagnétisme). Technique Moderne, vol. 16, no. 11, June 1, 1924, pp. 373-379, 8 figs. Discusses ferromagnetism, paramagnetism, and diamagnetism, real and apparent intensity of magnetization; review of present theories; theory of demagnetizing field.

See also FERROMAGNETISM.

Iron, Permeability of. See IRON, Permeability.

Magnetic Viscosity. See VISCOSITY, Magnetic.

Terrestrial. Terrestrial Magnetism of the U. S., N. H. Heck. Military Engr., vol. 16, no. 90, Nov.-Dec. 1924, pp. 482-486, 8 figs. Facts about earth's magnetism; method of making magnetic survey; magnetic observations; uses of magnetic information on land, air, and sea; future study and use of terrestrial magnetism.

The New Magnetic System of France (Le nouveau réseau magnétique de la France), E. Mathias. Annales des Postes Télégraphes & Téléphones, vol. 13, no. 5, May 1924, pp. 466-518, 2 figs. Improvements made in Moureaux system; magnetic charts; investigation of law of regular distribution of magnetic elements with aid of Moureaux system; magnetic anomalies and their explanation; usefulness of new magentic system for solution of different scientific problems.

MAGNETITE.

See IRON ORE, Magnetite.

MAGNETIZATION

Curves. See ELECTRIC CURRENTS, ALTERNATING, Magnetizing Curves.

Stress-Produced. See STEEL, Magnetization Produced by Stress.

MAGNETOMETERS

[See also ELECTRIC MEASURING INSTRUMENTS, Magnetometer; MAGNETIC FIELD, Measurement.]

Sensitive. A Sensitive Magnetometer. Insensitive to Extraneous Disturbances, E. P. T. Tyndall. Optical Soc. Am.—Jl., vol. 9, no. 4, Oct. 1924, pp. 465-468, 2 figs. Design described obliterates chief objection to magnetometric method, in that such a magnetometer may have great sensitivity without corresponding liability to erratic disturbances.

MAGNETOS

[See also IGNITION, Automobile Engines.]

French Types. Magnetos for Internal-Combustion Engines (Les magnetos pour moteurs à explosion), F. Collin. Génie Civil, vol. 84, nos. 18 and 19, May 3 and 10, 1924, pp. 426-430 and 447-452, 30 figs. General design of high-tension magnetos; principal parts; speed of rotation; primary and secondary winding; rupturing device; describes different types of magnetos of French design.

MAGNETS

Permanent. Influence of the Shape of Permanent Magnets Upon Their Residual Magnetism (Etude de l'influence de la forme des aimants sur le magnétisme rémanent), A. Michel and L. Veyret. Revue Générale de l'Electricité, vol. 15, no. 2, Jan. 12, 1924, pp. 43-52, 11 figs. Investigation to determine how shape of horseshoe-type permanent magnet affects intensity of its residual magnetism; girth, cross-section and center distance of magnet legs are taken into consideration; it was found that geometrically similar magnets are of about equal strength; simple formula is derived for calculating intensity of flux in horseshoe magnets; considerably stronger permanent magnets may be built if cobalt-steel alloy is used.

Judging Quality of Permanent Magnets (Die Bewertung der Güte von Dauermagneten), J. Würeschmidt. Zeit. für Physik, vol. 29, no. 3-4, 1924, pp. 175-185, 7 figs. Capacity and quality; symmetry of magnetisation curves of various kinds of steel; magnetization curve represented by elipses; calculations.

Permanent, Heat Treatment for. See STEEL, HEAT TREATMENT OF, Permanent Magnets.

Steel, Aging. See IRON AND STEEL, Magnetic Aging.

Steel for. See STEEL, Magnet.

Testing Instrument. The Ericsson Magnet Tester, A. Brookes. Testing, vol. 1, no. 3, Mar. 1924, pp. 223-226, 3 figs. Describes instrument which has been recommended for adoption as standard testing instrument for permanent magnets by British Eng. Standards Assn., developed to meet need for a rapid and reliable means of testing permanent magnets used in magetos, etc.

Torque on Cylindrical. Torque on a Cylindrical Magnet Through Which a Current Is Passing, J. Zeleny and L. Page. Physical Rev., vol. 24, no. 5, Nov. 1924, pp. 544-559, 4 figs. Develops theory and describes experiments performed to check theory.

MAGNOLITE.

See BUILDING MATERIALS, Magnolite.

MAGNUS EFFECT.

See AERODYNAMICS, Magnus Effect.

MAIL HANDLING

Conveyors for. See CONVEYORS, Mail and Parcel Transport.

MAIL TRANSPORTATION.

See COMPRESSED AIR, Pneumatic Mail Tubes.

MALLEABLE CASTINGS

Annealing. Cut Time of Malleable Anneal. Foundry, vol. 52, no. 2, Jan. 15, 1924, pp. 43-50, 13 figs. Construction and operation of tunnel type annealing oven of Int. Harvester Co., Chicago, Ill.; remote control featured; describes method followed in preparing castings for annealing and in handling them into and out of oven; accelerated production with improvement in uniformity of castings accomplished.

Europe. A European View of the Malleable Question, T. Levoz. Foundry Trade Jl., vol. 30, no. 419, Aug. 28, 1924, pp. 175-177. Discusses what is suitable metal, selection of furnace, electric-furnace experiments, methods of producing malleable iron, etc.

Feeders and Denseners. See IRON FOUNDING, Feeders and Denseners in.

Foundries. See FOUNDRIES, Malleable-Iron.

Manufacture and Properties. Malleable Castings. Eng. Production, vol. 7, no. 145, Oct. 1924, pp. 311-312, 1 fig. Notes on their properties and manufacture.

MALLEABLE IRON

Castings. See MALLEABLE CASTINGS.

Iron-Carbon Eutectoid. Identification of the Thermal Effect of the Iron-Carbon Eutectoid and Extrapolation of the Heating and Cooling Curve Values to Zero Rates. A. Hayes, H. E. Flanders, and E. E. Moore. Am. Soc. Steel Treating—Trans., vol. 5, no. 2, Feb. 1924, pp. 183-194, 6 figs. Application of thermal-analysis methods have been applied to location of iron-carbon eutectoid in malleable iron containing 0.95 per cent silicon; method places this point on iron-carbon diagram at temperature of 771 deg. cent.

Production in Short Annealing Periods. Possibilities of Producing Malleable Iron and Intermediate Products of Value in Short Annealing Periods, A. Hayes and W. J. Diederichs. Am. Soc. Steel Treating—Trans., vol. 6, Oct. 1924, pp. 491-498, 5 figs. Outlines laboratory methods for producing malleable iron in 31 hours or less and for producing intermediate products of desirable physical properties; relations between method of treatment, microscopic structures, and physical properties. Photomicrograhps.

MANAGEMENT. See INDUSTRIAL MANAGEMENT; RAILWAY MANAGEMENT.

MANGANESE

Australia. Notes on Manganese on the Darling Downs, L. C. Ball. Queensland Govt. Min. Jl., vol. 24, no. 283, Dec. 15, 1923, pp. 457-459. Description of the various deposits.

Determination. Determination of Manganese in Alloys Rich in This Metal (La determinazione del manganese nelle leghe ricche), I. Musatti and M. Croce. Giornale di Chimica Industriale ed Applicata, vol. 6, no. 1, Jan. 1924, pp. 12-17. Points out shortcomings in various volumetric methods given in text books for determining manganese in such alloys as spiegeleisen and ferromanganese; authors regard as best method that which involves oxidation of manganous salts to permanganate by means of sodium bismuthate.

Determination of Manganese in Metallurgical Products (Dosage du manganèse dans les produits métallurgiques), L. Bertiaux. Société Chimique de France—Bul., vol. 35-36, no. 10, Oct. 1924, pp. 1335-1351, 1 fig. Describes method which can be used in presence of aluminum, iron, zinc, cadmium, nickel, copper, and silver; it is not advisable to have more than 0.1 gr. of manganese present in solution.

The Determination of Managanese, R. W. Coltman. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 606-609, 2 figs. Manganous oxalate is proposed as primary standard in connection with determination of manganese by Volhard's method, chlorate method, and similar processes; its preparation, properties, and uses.

Georgia, Russia. Manganese Ore Reserves of Georgia, D. Zereteli. Iron & Coal Trades Rev., vol. 109, no. 2954, Oct. 10, 1924, p. 585. Production and export conditions of district of Tshiaturi. Abstract of pamphlet issued at The Hague.

Minerals. The Manganese Minerals: Their Identification and Paragenesis, Geo. A. Thiel. Economic Geology, vol. 19, no. 2, Mar. 1924, pp. 107-145, 13 figs. Methods for mineralographic determination of opaque manganese minerals; microscopic study of internal structure of each of these; textural relationships of manganese minerals to each other, and to iron oxides, as seen in polished sections, with special reference to manganiferous iron ores of Cuyuna Range.

Panama Deposits. Manganese Ore Deposits in Panama, J. F. Sheridan. Iron Age, vol. 114, no. 8, Aug. 21, 1924, pp. 444-447, 3 figs. Survey of mines and quantity available. Early shipments to American consumers.

Precipitation from Meteoric Solutions. The Precipitation of Manganese from Meteoric Solutions, G. A. Thiel. Am. Jl. of Sci., vol. 7, no. 42, June 1924, pp. 457-472. Results of a series of experiments dealing with relative effectiveness of various rocks and minerals of Deerwood iron formation of Cuyuna range, Minnesota, in precipitation of manganese from solutions.

Statistics. Manganese and Manganiferous Ores in 1922, H. A. Jenison and H. M. Meyer. U. S. Geol. Surv., no. I:25, Feb. 25, 1924, pp. 585-594, 1 fig. Statistics for United States on production, imports, consumption, and prices.

United States Situation. Report of Sub-Committee on Manganese. Min. & Met. Soc. of Am., vol. 17, no. 3, Mar. 1924, bul. no. 168, pp. 65-80, 1 fig. Study of manganese situation in United States. Requirements; domestic resources; comparison of domestic requirements and resources; adaptation of low-grade reserves; foreign resources.

MANGANESE BRONZE

Castings. The Production of Manganese Bronze Castings. Metal Industry (Lond.), vol. 25, nos. 16, 18, 21, and 23, Oct. 17, 31, Nov. 21, and Dec. 5 1924, pp. 377-378, 419-420, 497-498, and 541-543, 22 figs. Deals specifically with production of certain important castings of this alloy. Oct. 17: 24-cwt. hydraulic casting. Oct. 31: A boiler feedwater heater. Nov. 21: Large rudder frame. Dec. 5: Marine-propeller cone caps.

MANGANESE STEEL

Bibliography. Bibliography of Manganese Steel, E. H. McClelland. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1924, pp. 548-552. Books and periodical literature.

Casting. Casting Manganese Steel, H. E. Diller. Foundry, vol. 52, nos. 7 and 8, April 1 and 15, 1924, pp. 245-249 and 298-302, 14 figs. Apr. 1: Open-hearth converter and electric-furnaces processes; methods of adding manganese to steel; metal softened by heating in oven and quenching. Apr. 15: Heat treatment in electric furnaces; quality of metal determined by bending test piece; molding and handling track work.

Locomotive. High-Manganese Steel for Locomotives, E. F. Cone. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 824-825, 4 figs. Its properties when incorporated in cast-steel engine frames and crossheads. Composition and heat treatment.

Manufacture. Making Cast Manganese Steel, J. M. Quinn. Foundry, vol. 52, no. 24, Dec. 15, 1924, pp. 964-966, 2 figs. Rapid melting and proper method of making slag and alloy additions

play important role in producing satisfactory metal; how steel is heat treated.

Silico-. The Hardening of Silico-Manganese Steel, E. W. Golbeck and D. Hanson. Iron & Steel Inst.—Advance Paper, no. 5, for meeting May 1924, 18 pp. 26 figs. Experiments show that temperatures required for complete hardening of steels used are very much higher than corresponding hardening temperatures for straight carbon steels having same carbon content.

Welding. Welding of Manganese Steel. Am. Welding Soc.—Jl., vol. 3, no. 5, May 1924, pp. 10-23, 14 figs. Discusses briefly what manganese steel is, its properties, and why it has those properties. Investigations of what happens during welding of manganese steel, how actual operation may be best conducted, and what structural results of welding are in both base metal and weld. Preliminary report of Gas Welding Committee of Am. Bur. Welding.

See also ELECTRIC WELDING, ARC, Manganese Steel; OXY-ACETYLENE WELDING, Manganese Steel.

MANOMETERS

Electromagnetic. New Electro-magnetic Manometer. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 609-610, 7 figs. Instrument, invented by H. Martin, designed primarily and used for boiler steam-flow measurement, but lending its readily for other purposes.

High-Pressure, Measurement of. Measurement of High Pressures, F. H. Newman. World Power, vol. 1, no. 2, Feb. 1924, pp. 85-90, 7 figs. Compressed-gas type of manometer; elastic-membrane type of gage; optical lever and piezoelectrical manometer.

Highly Sensitive. A Manometer of High Sensitivity (Ein Manometer hoher Empfindlichkeit), L. Heis. Physikalische Zeit., vol. 25, no. 13, July 1, 1924, pp. 326-330, 3 figs. Instrument is diminutive form of Edelmann manometer provided with two pressure ducts which act upon two thin aluminum vanes, respectively, at each end of small indicator; suspension is especially designs for sensitivity, and deflections are recorded by movement of spot of light on horizontal ground-glass scale; new method is developed for finding susceptibility of gases.

Ionization. Ionization Manometer (Ionisationsmanometer), H. Simon. Zeit. für technische Physik, vol. 5, no. 6, 1924, pp. 221-233, 19 figs. Use of ordinary three-electrode valve for determination of relations between gas pressure and ionization is discussed theoretically and experimental results described; ionization with grid positive and anode negative is greater for given positive voltage than with grid negative and anode positive; manometer may be used to compare rates of exhaustion of vessel with different gases; shows that specific emission of tungsten filament is increased by occlusion of gas.

Recording. Modern Pressure Measuring, with Special Reference to Recording Manometers (Neuzeitliche Druckmessungen, unter besonderer Berücksichtigung der Schreibmanometer), J. Wohlfarth. Zeit. für technische Physik, vol. 5, no. 9, 1924, pp. 361-368, 18 figs. Discusses importance of accurate measuring; difference between leaf- and tube-spring manometers; production and functioning of tube springs; new types of recording manometers.

MANUFACTURE, INTERCHANGEABLE. See INTERCHANGEABLE MANUFACTULE.

MANUFACTURING

Close Limits. Some Limitations on Manufacturing to Close Limits, B. H. Blood. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 186-188 and 205, 8 figs. What precise measurements really mean; tolerances in manufacturing operations; examples of close measurements; practical examples from everyday commercial work.

Interchangeable. See INTERCHANGEABLE MANUFACTURE.

Quantity Production, Accuracy in. Accuracy in Production Engineering, J. E. Baty and A. J. C. Brookes. Eng. Production, vol. 7, nos. 137 and 138, Feb. and Mar. 1924, pp. 48-56 and 64-67 and (discussion) 67-69, 18 figs. Some developments in measuring and latest scientific advancement in practical measurement in its application to economical quality production; production and maintenance of standards in form of reference length bars.

Simplification. Economic Progress of Simplification, E. W. McCullough. Iron Age, vol. 113, no. 4, Jan. 24, 1924, pp. 285-287. More than five-sixths of number of varieties formerly used have been eliminated in some industries; help of trade associations.

MANUFACTURING PLANTS. See AUTOMOBILE MANUFACTURING PLANTS; FACTORIES; FOUNDRIES; MACHINE SHOPS, etc.

MAPPING

Aerial. Aerial Maps Made to Facilitate California Home-Site Survey, T. R. Mini. Eng. News-Rec., vol. 93, no. 7, Aug. 14, 1924, pp. 264-265, 1 fig. Mosaic superimposed on plan-table topographic sheet eases work of plotting roads and trails in hills near Pasadena.

Aerial Photography in. Aerial Photography an Aid to Better Map Making, Gerard H. Matthes. Eng. News-Rev., vol. 92, no. 1, Jan. 3, 1924, pp. 25-27. Explains uses to which engineer can put bird's-eye, mosaic and line maps in revivifying and bettering map making.

Air Photography as an Aid to Survey, F. J. Salmon. Surveyor, vol. 34, no. 3, Nov. 1923, pp. 98-106. Troubles to contend with in producing maps from photographs; methods used in air photo mapping during war and which, so far, do not appear to have been very markedly improved upon; attempts that have been and are being made to overcome major difficulties.

Airplane Sketches and Maps (Luftbildskizze und Luftbildkarte), A. Schlötzer. Bauingenieur, vol. 5, no. 4, Feb. 29, 1924, pp. 81-86, 5 figs. partly on supp. plate. Use of airplane photographs for drawing of new maps as well as for checking up and correction of old ones is described and illustrated by an example. Such maps are as exact as topographical ones.

Photographical Measuring Methods (Fotografiska mätmetoder). Teknisk Tidskrift, vol. 54, nos. 5, 8, and 9, Feb. 2, 23, and Mar. 1, 1924, pp. 34-36, 60-63, and 67-70 (Allmänna Avdelningen), 13 figs. Explains theory of may drawing from photographs and describes various methods of taking suitable photographs from airplanes. Describes autocartograph, designed by Hungershoff and built by Heyde, and stereoautograph, invented by v. Orel and designed and built by Zeiss in Jena, and explains how to use them to draw maps from airplane photographs.

Stereophotography in Aerial Mapping, J. W. Bagley. Military Engr., vol. 16, no. 88, July-Aug. 1924, pp. 303-306, 9 figs. Operation of stereoscope; difficulty in securing vertical photographs and of interpreting those taken at a slant; gyroscopic stabilizers, etc.

The Making of Greater New York's Air Map. Aviation, vol. 16, no. 1, Jan. 7, 1924, pp. 16-17, 1 fig. Planes flew 3000 mi. and photographed 625 sq. mi. on largest city mapping project ever attempted.

See also SURVEYING, Aerial.

Earth-Figure Variations, Effect of. Effect of Variations in the Assumed Figure of the Earth on the Mapping of a Large Area, W. D. Lambert. U. S. Coast & Geodetic Survey—Spec. Pub. No. 100, serial no. 256, 1924, 35 pp., 6 figs. Various determinations of earth's mean figure; spheroids actually in use for geographic purposes; effect of change in dimensions of spheroid on computation of a triangulation; effect of change of spheroid on triangulation covering a large area; examples of effect of change of spheroid; formulas for computation of geodetic positions over long lines.

France, Methods and Instruments Employed. The New Maps of France (Les nouvelles cartes de France), A. B. des Chaumes. Génie Civil, vol. 84, no. 6, Feb. 9, 1924, pp. 125-128, 9 figs. partly on supp. plate. Map on scales of 1/20,000 and 1/50,000; actual status and plans made for execution of maps; methods of execution. See also article by same author, entitled Method of Preparing the New Map of France, in same journal, no. 7, Feb. 16, 1924, pp. 149-156, 13 figs., describing methods and instruments employed.

Orebody Cross-Sections. See ORE DEPOSITS, Mapping Cross-Sections of.

Photographic. Photographic Surveying for Mining Engineers, L. A. Woodworth. Eng. & Min. Jl.-Press, vol. 118, no. 13, Sept. 27, 1924, pp. 485-490, 8 figs. Describes author's experience in photographic mapping. Bibliography.

Topographic. A Review of Topographic Mapping, G. S. Smith. Military Engr., vol. 16, no. 86, Mar.-Apr. 1924, pp. 108-115, 7 figs. partly on supp. plate. Review of development of topographic mapping, and experience of government organizations.

See also AERIAL PHOTOGRAPHY, Topographic Mapping.

Variations in Figure of Earth, Effect of. Effect of Variations in the Assumed Figure of the Earth on the Mapping of a Large Area, W. D. Lambert. U. S. Coast & Geodetic Survey—Spec. Pub. No. 100, serial no. 258 (1924), 35 pp., 11 figs. Various determinations of earth's mean figure, spheroids actually in use for geographic purposes, effect of change in dimensions of spheroid on computation of triangulation, effect of change of spheroid on triangulation covering large area. Gives formulas and makes calculations. Tables.

MARBLE

Electric Conductivity of. Electric Conductivity of Marble (Leitfähigkeitsmessungen an Marmor), G. Stetter. Physikalische Zeit., vol. 25, no. 18, Sept. 15, 1924, pp. 441-443. Dependence of electric resistance on moisture; tests carried out in air saturated with moisture and in dry air; electric conductivity as index to constitution of rock.

Peru. Marble: A New Peruvian Industry, N. Rounsevell. Pan Am. Union, vol. 58, no. 6, June 1924, pp. 551-561, 10 figs. Quarry at Pachacamac, producing beautiful "black and gold" marble; notes on factory equipment; what marble industry means for Peru.

Tennessee. Marble Deposits of East Tennessee. Tenn.—Dept. Education, Division Geology, Bul. no. 28, 1924, 264 pp., 112 figs. partly on supp. plates. Pt. I: Occurrence and Distribution, by C. H. Gordon; Pt. II: Constitution and Adaptation of the Holston Marbles, T. N. Dale; Pt. III: Technology of Marble Quarrying, O. Bowles.

MARINE BOILERS

Care and Maintenance. The Economical Working of Marine Cylindrical Boilers. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, pp. 85-86 and 103. Discusses points in connection with care and maintenance of Scotch boilers after a voyage, before lighting up, and while steaming.

Combined Fire-Tube and Water-Tube. A Combined Fire-Tube and Water-Tube Boiler. Shipbldg. & Shipg. Rec., vol. 24, no. 26, Dec. 25, 1924, pp. 745-746, 3 figs. Trial results of Prudhon-Capus boiler which is finding increasing adoption in French merchant service.

Explosions. See BOILER EXPOSIONS, Marine Boilers.

Oil Burning in. Oil Burning in Marine Boilers. Mar. Engine & Nav. Architect, vol. 47, no. 557, Feb. 1924, pp. 68-69. Bunkering considerations; precautions; entering tanks; heating of oil; feeding to burners; cones.

Prudhon-Capus. A Marine Boiler with Accelerated Circulation. Mar. Engr. & Nav. Architect, vol. 47, no. 556, Jan. 1924, pp. 33-34, 1 fig. Prudhon-Capus boiler to be adopted on new French liners.

Scotch. Scotch Marine Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 28-30, 5 figs. General considerations of types and details of construction.

Tests. Tests of Marine Boilers, H. Kreisinger, J. Blizard, A. R. Mumford, B. J. Cross, W. R. Argyle and R. A. Sherman. U. S. Bur. Mines—Bul. 214, 1924, 302 pp., 181 figs. partly on supp. plates. Describes evaporative tests of marine water-tube boilers and of a Scotch marine boiler, also method of conducting tests and such special studies as were made of: combustion in furnaces; heat absorption by boilers; flow of gases through boilers by means of temperature, pitot-tube, and draft measurements; insulation of furnace walls; circulation of water in boiler; effect on heat transmission of blowing soot off heating surfaces with steam blowers; and use of special equipment to improve combustion or to improve heat absorption.

Tests on a Cylindrical Marine Boiler with and without Preheated Air, W. H. Owen. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 244-248, 8 figs. Account of tests undertaken to ascertain what economical results were to be expected from a marine boiler of cylindrical type when air for combustion was preheated by new form of heater to a degree much higher than had been possible with type of apparatus hitherto used, and to compare this efficiency with that obtained with natural draft. Abstract of paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Water-Tube. Standard Conditions for the Design and Construction of Water-tube Marine Boilers. Mech. Wld., vol. 75, no. 1940, Mar. 7, 1924, pp. 149-150. Rules for water-tube boilers, based on recommendations of British Marine Engineering Design and Construction Committee, recommended for adoption by Board of Trade, Lloyd's Register, British Corporation, and Bureau Veritas.

Water-Tube, Feed Systems. Details of Feed Systems for Marine Water-tube Boilers, C. C. Pounder. Mech. Wld., vol. 76, nos. 1972 and 1975, Oct. 17 and Nov. 7, 1924, pp. 246-247 and 293-294, 4 figs. Oct. 17: Discusses two systems. Nov. 7: Deals with avoidance of trouble from calcareous deposits and from corrosion, and with arrangement of pipes and mountings.

MARINE BORERS

Bermuda. Marine Borers in Bermuda, E. L. Mark, and New Species of Shipworms in Bermuda, W. F. Clapp. Am. Acad. Arts & Sci.—Proc., vol. 59, no. 11-12, May 1924. Contributions from Bermuda Biological Station for Research, nos. 142 and 143, pp. 259-294, 30 figs.

Destructive Action of. The Deterioration of Structures in Sea-Water. Engineering, vol. 118, no. 3075, Dec. 5, 1924, pp. 774-775. Review of report published by Committee of (Brit.) Instn. Civ. Engrs., giving results of experiments and observations.

Destructive Organisms. Destructive Marine Organisms. Engineering, vol. 137, no. 3027, Jan. 4, 1924, pp. 5-7. Refers to portions of three reports of committee appointed by Instn. Civ. Engrs. in 1916, dealing with timber and marine organisms which attack it.

Mollusk. Observations on Rock Boring Mollusks in Concrete, W. R. Sadler and D. E. Hughes. Eng. News-Rec., vol. 93, no. 26, Dec. 25, 1924, pp. 1027-1028. Analyses show acid used by borers in cement mortar at Los Angeles harbor; aggregate unlike rock on beach is immune.

Piling, Destruction by. See PILES, Marine Borers, Destruction by.

Protection Against. New Preservative Solution for Wooden Hulls May End Ravages of Teredo Worm. Nautical Gaz., vol. 106, no. 11, Mar. 15, 1924, p. 284. Description of Holzapfel mercurized process for making marine borers harmless.

Results of Experiments in Treatment of Piling Specimens Against Attack by Marine Borers, J. D. Maclean. Eng. & Contracting (Railways), vol. 61, no. 3, Mar. 19, 1924, pp. 626-634, 6 figs. Résumé of research work carried on by United States Forest Service over a period of 12 years.

The Preservation of Marine Structures, Wm. G. Atwood. Military Engr., vol. 16, no. 90, Nov.-Dec. 1924, pp. 507-510, 6 figs. Results of investigations of Nat. Research Council, supplementary to previous articles in same journal (May-June 1923); it is shown that certain species of shipworms can cause great damage in water of much lower salinity than had previously been thought; pile coatings and non-metallic armors are less expensive and less efficient than some impregnating methods and metal armors; other results.

Wood Preservation Against. See WOOD PRESERVATION, Marine Borers.

MARINE ENGINES

Lentz. Double Compound Reciprocating Engine of Steamer "Bilbao" (Die Doppelverbund-Kolbenmaschine des Dampfers "Bilbao"), J. Eggers. Hanomag-Nachrichten, vol. 11, no. 129-130, July-Aug. 1924, pp. 139-142, 4 figs. Design and construction of Lentz unit marine engine for single-screw freight steamer Bilbao; fuel consumption 0.48 kg. coal per i.hp.

Oil Engines. See OIL ENGINES, Marine.

Reciprocating, Water Rates of. Water Rates of Marine Reciprocating Engines, E. A. Stevens, Jr. Mar. Eng., vol. 29, nos. 5 and 6, May and June 1924, pp. 293-297 and 364-368, 9 figs. Quick method of estimating water rates with a reasonable degree of accuracy; effect of change of clearances; correction for fractional loads; superheat; variations; triple-versus quadruple-expansion engines; problems illustrating methods of estimating water rates.

MARINE STEAM TURBINES

Auxiliary Machinery, Drive of. The Application of the Steam Turbine for Auxiliary Machinery, R. W. Allen. Engineering, Apr. 11, 1924, pp. 477-479, 7 figs., Engineer, vol. 137, no. 3565, Apr. 25, 1924, pp. 455-457, 1 fig., and Mar. Eng. & Shipg. Age, vol. 29, no. 9, Sept. 1924, pp. 554-555 and 558, 5 figs. General advantages of turbine; turbine-driven electric generating sets, boiler feed pumps, and boiler-room fans; adaptability of turbine to general arrangement of machinery in engine and boiler rooms. (Abstract.) Paper read before Instn. Nav. Architects.

Balancing Rotors. Method of Balancing Turbine Rotors of Scout Cruiser Raleigh, C. Bean. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 1, Feb. 1924, pp. 30-33, 5 figs. Balancing device and method of making test.

Blade Material. Steam and Compressed-Air Trials with Turbine-Blade Material (Dampf- und Druckluftblasversuche mit Turbinenschaufelmaterial), B. Schulz. Brennstoff- u. Wärmewirtschaft, vol. 6, no. 6, June 1924, pp. 138-140, 2 figs. Discusses tests carried out by German Navy in devising acceptance test for blade material; 25 per cent Ni steel gave best results.

De Laval. Geared Turbine Drive. Pacific Mar. Rev., vol. 21, no. 4, Apr. 1924, pp. 216-217 and 242, 4 figs. Particulars of De Laval compound steam turbine with double-reduction gear, which is to be installed in Southern Pacific single-screw passenger steamer.

Design and Operation. Water Rates of Geared Turbines, H. E. Brelsford. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 171-174, 4 figs. Design and operating factors of impulse, reaction and combined impulse reaction turbines tending to increase economy.

Geared. Geared Turbine Machinery for the SS. "Drottningholm." Engineering, vol. 118, no. 3077, Dec. 19, 1924, pp. 841-842, 12 figs., partly on supp. plate and p. 834. Details of turbines constructed by Aktiebolaget de Lavals Angturbin, Stockholm, and installed in vessel, formerly S. S. Virginian.

High Pressure and Superheating. Modern Tendencies in Steam Turbine Power Plants, E. Berg. Mar. Eng., vol. 29, no. 5, May 1924, pp. 305-309, 10 figs. Advantages obtained in adoption for marine propulsion of high steam pressure, high superheat, steam extraction for heating feedwater and reheating. Abstract of paper read before metropolitan section of A. S. M. E.

Mauretania Turbines, Repair of. Reconditioning the Turbines of the s.s. Mauretania. Engineer, vol. 137, no. 3564, Apr. 18, 1924, pp. 410-412, 4 figs. Describes repairs carried out in 1923.

Reaction. Operating and Maintaining Marine Reaction Turbines, O. M. Gordon. Mar. Eng., vol. 29, no. 11, Nov. 1924, pp. 673-676. Practical suggestions on proper methods of operating, adjusting, and maintaining both turbine and reduction gear.

Reduction Gears. See REDUCTION GEARS.

Reversing-Clutch. The Reserving-Clutch Marine Turbine, O. A. Wiberg. Engineering, vol. 118, no. 3056, July 25, 1924, pp. 144-145, 5 figs. Describes oil-operated reversing clutch in connection with mechanical reduction gear and its successful application to number of ships. Abstract of paper read before World Power Conference.

MARTENSITE

Nature of. See IRON, Martensite, Nature of.

MASONRY

Calculation. Calculation of Masonry of Rectangular Cross-Section Under Compound Bending Load (Note sur le calcul des massifs en maçonnerie à section rectangulaire sollicités par flexion plane composée), F. Campus. Association des Ingénieurs sortis de l'Ecole Polytechnique de Bruxelles—Bul. Technique, vol. 19, no. 5, 1923, pp. 199-209, 3 figs. Discusses elastic stability of masonry and simplifies application of classical formulas.

Strength of. See MORTARS, Elasticity and Strength of Masonry.

MATCH MANUFACTURE

France. Manufacture of Matches in the French State Factories (La fabrication des allumettes dans les manufactures de l'état français). Nature, no. 2633, Sept. 20, 1924, pp. 180-186, 7 figs.

Details of manufacture of seven kinds of matches, including processes and equipment used.

MATERIALS

Care and Control. The Care and Control of Raw Materials. Factory, vol. 32, no. 6, June 1924, pp. 831-834, 872, 874 and 876, 4 figs. Plan adopted by Bausch & Lomb Optical Co. involves use of one central store and branch or divisional stores.

Elastic Limits. The Static and Dynamic Elastic Limit in Material Testing and Construction (Die statische und dynamische Elastizitätsgrenze im Marerialprüfungs- und Konstruktionswesen), G. Welter. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 1, Jan. 5, 1924, pp. 9-11, 3 figs. Points out necessity for reform in material-testing practice and makes plea for detailed investigation of statistically and dynamically true limit of elasticity of all structural materials, in order to keep pace with requirements of modern machinery construction.

Elasticity. See ELASTICITY.

Elasticity and Fatigue Breakdown. The Elastic Limit in Tension, and Its Influence on the Breakdown by Fatigue, J. M. Lessells. Engineering, vol. 118, no. 3076, Dec. 12, 1924, pp. 813-814, 9 figs. Deals with degree of influence which elastic properties of materials exert on their actual breakdown by fatigue; describes apparatus, and method of procedure; tension and fatigue; endurance by deflection. (Abstract.) Paper read before Instn. Mech. Engrs.

Fire-Resisting. Temperature Limits of Technical and Scientific Work (Materials of Greatest Resistivity Against Fire) [Die Temperaturgrenzen technischer und wissenschaftlicher Arbeit (die feuerbeständigsten Stoffe)], O. Ruff. Metall u. Erz, vol. 21, no. 12, June 2, 1924, pp. 272-277. Discusses carbon and tungsten as of highest resistivity, followed by some carbides and oxides including aluminum oxide and zinconium dioxide, also chemical behavior of these in furnace gases, etc.

Handling. See MATERIALS HANDLING.

Heat Conductivity of. Determination of Heat Conductivity of Engineering Materials (Ueber die Bestimmung der Wärmeleitfähigkeit technischer Materialien), Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 233-236, 4 figs. Results of tests with materials used in building construction and machine construction.

Magnetic Properties, Testing of. A Null Method for Testing Magnetic Properties of Materials, Y. Niwa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 435, Oct. 1924, pp. 929-953, 17 figs. Description of theory, construction and operation of double bar and double yoke type permeameter devised by author, and experimental studies made of it. Gives satisfactory results in measurement of magnetic properties of solid and sheet materials of iron and steel. (In English).

Overstrain and Strength. A New Theory on Overstrain and Strength of Materials, H. P. Troendly and G. V. Pickwell. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 145-170, 7 figs. Discusses new theory on mechanics of overstrain and strength, i.e., plastic transfer of proportional elastic range; increase in strength in any direction is at expense of strength in opposite direction; increase in strength in direction of overstrain is through mechanism of slip, etc.

Plastic Deformations. The Theory of Plastic Deformations and Subsequent Stresses Caused by Them in Materials (Zur Theorie plastischer Deformationen und der hierdurch im Material hervorgerufenen Nachspannungen), H. Hencky. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 4, Aug. 1924, pp. 323-334, 5 figs. Author demonstrates physical importance of A. Haar's and v. Kármán's work on behavior of plastic media in the vicinity of the elastic field, and shows that by adopting their method a system of differential equations can be obtained which covers entire field of plastically elastic problems of equilibrium.

Plymax. A New Steel Coated Material, F. W. Cook. Can. Machy., vol. 32, no. 17, Oct. 23, 1924, p. 23, 8 figs. Notes on a material known as "Plymax," made by Venesta Ltd., of Lond., Eng., consisting of a plywood core, to which light-gage galvanized iron or lead-coated sheet steel is rigidly fixed. Claimed to be 80 times as stiff as steel plate and twice as stiff as ordinary plywood, weight for weight.

Rupture. Conditions Causing Rupture of Material (Betingelserna för materialbrott), A. F. Samsioe. Teknisk Tidskrift, vol. 54, no. 24, June 14, 1924, pp. 221-223 (Allmänna Avdelningen), 7 figs. Older theories are recorded. Guest's experiments with tough metals are described. Shearing stress or greatest difference between occurring stresses in different directions are proved to cause ruptures of material. Mohr's theory for brittle materials is explained.

Sampling for Inspection. Methods of Sampling for Material Inspection, H. M. Phillips. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 276-278. Study of application of laws of chance; specific cases.

Temperature, Effect of. The Effect of Low and High Temperatures on Materials, F. C. Lea. Engineering, vol. 118, nos. 3076 and 3077, Dec. 12 and 19, 1924, pp. 816-817 and 843-845, 24 figs. Deals with statical tests at temperatures ranging from —80 deg. cent. to 1000 deg. cent. in testing machines of ordinary character to determine elastic properties, breaking strengths, and other data generally obtained by tests at ordinary temperatures; investigation of effect of time upon metals loaded with known stresses; creep phenomena, and stress at various temperatures at which creep in time becomes or does not become zero; hardness tests, and repetition tests. (Abstract.) Paper read before Instn. Mech. Engrs.

Testing. Strength and Material Testing (Festigkeit und Materialprüfung), P. Ludwik. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 212-214, 6 figs. Difference in strength and notch action in static, dynamic, and variable stress. Report from Experimental Engineering Inst. of Vienna Technical High School.

MATERIALS HANDLING

Accidents. A Study of Fatal Accidents in Material Handling, D. S. Beyer. Nat. Safety News, vol. 9, no. 3, Mar. 1924, pp. 27-28. Statistical data, and particulars of 16 fatal accidents reported to Liberty Mutual Insurance Co., Boston, Mass.

Apparatus. Characteristics of Construction and Operation of Apparatus for Mechanical Handling (Caractéristiques de construction et de fonctionnement des appareils de manutention mécanique), E. Pacoret. Technique Moderne, vol. 16, no. 21, Nov. 1, 1924, pp. 695-752, 93 figs. Classification of apparatus; continuous conveyors; calculation of aerial cable conveyors; use of electromagnets; various types of electric control; electric braking; safety rules; apparatus for use in shipbuilding yards, harbors, ships, marine and railway terminals, metallurgical plants, foundries, mines, etc.

Production and Conveying of Raw Materials (Rohstoffgewinnung und Beförderung), E. Simon. Tonindustrie-Zeitung, vol. 48, no. 76, Sept. 20, 1924, pp. 829-831, 7 figs. Apparatus shown at

Seddin Railway Exposition, including automatic unloaders, dredges, locomotives, etc.

See also Equipment.

Ashes. See ASH HANDLING.

Automobile Manufacturing Plants. Cutting Costs by the Use of Conveyors, F. H. Colvin. Am. Mach., vol. 60, no. 26, June 26, 1924, pp. 969-971, 7 figs. Some of the Maxwell methods of handling chassis and body in their various stages, and some time-saving devices employed.

Flexibility in Handling Production Material, A. A. Brown. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 148-150. Routing and handling materials through receiving department; stocking of materials; service-department requirements; shortage report and its significance; stock records.

Lumber Handling in an Automobile-Body Plant, B. Nagelvoort and T. D. Perry. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 472-477 (includes discussion), 11 figs. Yard layouts for efficient and economical handling, storing, drying, and cutting of lumber. Steam consumption of dry kilns. Equipment for handling lumber, including dry-kiln trucks and transfer cars, power transfer cars, lumber lifts, stackers, etc.

Material Handling as Our Key to Many Savings, M. R. Denison. Factory, vol. 33, nos. 1 and 2, July and Aug. 1924, pp. 30-33, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, and 86; and 190-193 and 242-246, 27 figs. Important economies in labor, in inventory, and in floor space that have come out of material-handling methods at Studebaker plant. Details of methods.

Material Handling Is Cut to Minimum in Jewett Assembly Plant, W. L. Carver. Automotive Industries, vol. 50, no. 6, Feb. 7, 1924, pp. 281-288, 10 figs. Facilities for straight-line material flow and elimination of burdensome handling incorporated in new assembling plant of Paige-Detroit Motor Car Co.

Material-Handling Problems Encountered in the Assembly of Automobiles, M. R. Denison. See also Automotive Manufacturer, vol. 66, nos. 3 and 4, June and July 1924, pp. 24-26 and 10-12, 1 fig. Mech. Eng., vol. 46, no. 6, June 1924, pp. 339-342. Time- and labor-saving methods devised for handling and inspection of raw materials and finished parts in large modern automobile-manufacturing plant; deals with functioning of stores divisions as service departments, loss of material, reductions effected in amount of clerical labor required, instruction of store-room men, location of store rooms, handling sheet metal, transportation, final car assembly, etc.

Wide Use of Material Handling Equipment in Auto Plants. Automotive Mfr., vol. 65, nos. 10, 11, 12, and vol. 66, nos. 1 and 2, Jan., Feb., Mar., Apr. and May 1924, pp. 21-23 and 30, 11-13, 5-9, 19-20, and 6-8, 21 figs. The various kinds of conveyors used and the widely differing work which they are doing successfully and at a saving. Symposium presenting advantages of all forms.

Brick Plants. Mechanical Handling Equipment in Face Brick Manufacture, G. L. Montgomery. Chem. & Met. Eng., vol. 31, no. 11, Sept. 15, 1924, pp. 412-416, 9 figs. Describes plant of Bradford Brick & Tile Co. at Lewis Run, Pa., in which most modern mechanical handling devices have been adopted throughout.

See also BRICKMAKING, Materials Handling.

Cable Tramways. See CABLE TRAMWAYS.

Cableways. See CABLEWAYS.

Cake Bakery. Conveying under Difficulties in a Cake Bakery, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 7, Apr. 3, 1924, pp. 189-192, 4 figs. Satisfactory solution of difficult problem of installing conveying plant at cake bakery of Kearley & Tonge, Ltd., which was laid out in a way which rendered adoption of handling plant most difficult.

Cargoes. See CARGO HANDLING.

Cement Mills. Handling 42,000,000 Tons of Raw Materials a Year, L. N. Duryea. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 155-160, 11 figs. Mechanical conveying methods in cement industry.

Clay. See JETTIES, Clay-Cargo.

Coal. See COAL HANDLING.

Coke. See COKE HANDLING.

Concrete Building Units Manufacture. Economical Handling of Raw Materials in Building Unit Manufacture. Concrete, vol. 25, no. 1, July 1924, pp. 13-18, 6 figs. Summary of methods in common use in excavating and handling sand and gravel, according to conditions to be met.

Concrete Materials. See CONCRETE CONSTRUCTION, Swiss Alps.

Conveyors. See CONVEYORS.

Cost-Saving Methods. Materials Handling Methods That Have Added to Industrial Profits, Geo. E. Hagemann. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 557-562, 1 fig. Experience data from 55 plants using larger equipment.

Cotton Mills. See CONVEYORS, Cotton-Mill.

Cranes. See CRANES.

Derricks. See DERRICKS.

Economies of. Fundamental Economies of Materials Handling, M. L. Begeman. Mech. Eng., vol. 46, no. 7, July 1924, pp. 405-409 and (discussion) 410. Discusses advantages of handling materials mechanically without reference to particular types of equipment; deals with necessity for substitution of mechanical handling of materials for labor and the economies to be gained by such substitution; points to be considered in analysis of proposed installation.

Elevators. See ELEVATORS.

Equipment. Cutting Corners in Material Handling, A. G. J. Rapp. Blast Furnace & Steel Plant, vol. 12, no. 4, Apr. 1924, pp. 12-16, 14 figs. Horizontal conveyors, vertical hoists, tractors, cranes and savings effected by their use.

Improvements in Transportation Engineering (Allgemeine Fortschritte auf dem Gebiete der Transporttechnik), C. Michenfelder. Praktische Maschinen-Konstrukteur, vol. 57, no. 8, Mar. 1, 1924, pp. 77-79, 6 figs. Describes latent designs of electric industrial trucks, electric cranes and conveyors.

Measuring the Savings of Mechanical Handling, W. T. Spivey. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 551-556, 8 figs. Factors in selection of equipment for an installation.

Mechanical Handling Machinery at the British Empire Exhibition, Wembley. Indus. Mgmt. (Lond.), vol. 11, nos. 11, 12, 13, 14, and 15, May 29, June, July, Aug., and Sept., pp. 297-300, 327-329, 355-360, 385-387, and 415-420, 16 figs. Describes exhibits of different firms; also coal and ash-handling plant of Empire Exhibition power plant.

Speeding Industrial Progress, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 67, no. 6, June 1924, pp. 348-355, 12 figs. How mechanical handling is revolutionizing all industry.

Trends in Handling Materials, F. E. Gooding. Indus. Engr., vol. 82, no. 2, Feb. 1924, pp. 81-89, 12 figs. Reviews present tendencies and practices in industrial plants in handling material by conveyors, industrial trucks, tractors, hoists, and similar equipment.

Factories. Development of Conveying and Unloading Plants Into Large Scale Installations (Die Entwicklung der Förder- und Verladeanlagen zu grossen Abmessungen and Leistungen), G. von Hanffstengel. Maschinenbau, vol. 3, no. 16, May 22, 1924, pp. 557-567, 34 figs. Discusses extensions of conveying and unloading plants generally; advantages of large capacities; progress in various conveying systems; conveying by air or water.

Receiving, Storing and Issuing Factory Materials, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 120-126, 9 figs. Explains fundamentals which govern working out of practical system for any given set of conditions.

Shop Transportation Economics, S. M. Lowry. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 533-538, 6 figs. Westinghouse Elec. & Mfg. Co.'s methods and results.

Flour. See CONVEYORS, Flour Mills.

Ford Motor Co. Plants. Material Handling a Factor in Ford Profits, A. Murphy. Can. Machy., vol. 32, no. 26, Dec. 25, 1924, pp. 135-143, 20 figs. Shows economies of mechanical equipment at Ford, Ont., plant.

Mechanical Handling at River Rouge, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 68, no. 2, Aug. 1924, pp. 67-114, 103 figs. Describes receiving and distributing raw materials, blast furnace as a materials-handling problem, world's most modern foundry, handling large castings through production operations in machine shop, power-house fuel handling and electric-furnace building, sawmill and the tractor assembly, successful innovations in plate-glass manufacture, mechanical handling in by-products plant, and miscellaneous industries within Ford plant.

Foundries. See FOUNDRIES, Materials-Handling Equipment.

Freight. See FREIGHT HANDLING.

Glass Plants. Handling of Materials in Modern Glass Plant, D. M. Ewell. Eng. Wld., vol. 25, no. 3, Sept. 1924, pp. 157-161, 10 figs. See also Belting, vol. 25, no. 3, Sept. 1924, pp. 48-54, 10 figs. Describes facilities at works of Owen Bottle Co., Charleston, W. Va.

Materials Handling in Glass Works (Materialbewegung in Glashütten), C. Michenfelder. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 21, May 24, 1924, pp. 515-519, 20 figs. Nature and quantity of material to be handled; problems connected with transport of coal, mixtures and glass.

Grain. See GRAIN ELEVATORS; GRAIN HANDLING.

Labor-Saving Equipment. Quality Production from the Application of Automatic Handling Equipment, C. J. Alfred. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 563-566, 7 figs. Labor-saving methods of Am. Sugar Refining Co.

Lifting Jacks. See LIFTING JACKS.

Lignite. See LIGNITE, Conveying.

Loaders and Unloaders. Mechanical Loaders and Unloaders, Math. W. Potts. Indus. Mgmt. (N. Y.), vol. 67, no. 2, Feb. 1924, pp. 107-114, 13 figs. How they cut costs and decrease car shortage.

Locomotive Coaling Plants. See LOCOMOTIVES, Coaling Plants.

Lumber. See AUTOMOBILE MANUFACTURING PLANTS, Materials Handling in; LUMBER, Handling.

Machine Shops. Train-Despatching in an Automotive-Parts Shop, R. S. Spencer. Am. Mach., vol. 60, no. 26, June 26, 1924, pp. 945-946, 3 figs. How a force of 250 truckers has been reduced to 9 men by application of railroad train-despatching methods to inter-departmental transportation of materials.

Metal-Working Plants. Handling Materials in Metal Working Plants. Can. Machy., vol. 32, no. 12, Sept. 18, 1924, pp. 29-33, 8 figs. Types of equipment; moving cars and materials; types of cranes.

Metallurgical Works, Ruhr. Materials Handling in the Metallurgical Industry of the Ruhr (Les engins de manutention dans l'industrie de la Ruhr), R. de Boysson. Vie Technique & Industrielle, vol. 5, no. 54, Mar. 1924, pp. 365-371, 12 figs. Describes gantries and cranes employed in storage houses and yards, blast-furnace, rolling-mill equipment, and foundry equipment, interplant transportation, and private railways connecting mines and plants.

Methods. Material Handling in a Plant Making a Diversified Product, H. C. Perkins. Factory, vol. 33, no. 5, Nov. 1924, pp. 654-657, 730 and 732, 10 figs. Results obtained from installing conveyors; semaphores simplified handling of trucks.

Offices. Mechanical Conveying Apparatus in Business (Les appareils transporteurs mécaniques de bureau), J. Jacob. Technique Moderne, vol. 16, no. 23, Dec. 1, 1924, pp. 815-821, 24 figs. Discusses systems and apparatus for conveying papers, documents, etc., for large offices, banks, department stores, etc., including gravity systems, belt conveyors, pneumatic tubes, and pick-up systems.

Ore. See ORE HANDLING; ORES, Transportation by Airplane.

Plant Painting Department. Handling Material in Painting Department, E. T. Bennington. Iron Age, vol. 113, no. 20, May 15, 1924, pp. 1413-1416, 6 figs. Overhead tramways with special carriers take filing cabinets through three dips, a drip and drying oven; automatic equipment featured.

Profitable Methods. Materials Handling Methods That Have Added to Industrial Profits, Geo. E. Hagemann. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 693-694, 2 figs. Experience data on actual installations; cost of operation of 15-ton Brownhoist crane, and link-belt conveyors.

Railway Shops. Identification of Material Handling Costs Develops Unusual Possibilities. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 706-714, 7 figs. Materials-handling system established in Angus shops of C. P. railway makes possible correct cost finding and permits control of production costs.

Routing. Controlling the Flow of Package Products by Materials Handling Equipment, J. Mendleson. Mgmt. & Administration, vol. 7, no. 5, May 1924, pp. 545-550, 8 figs. Labor-saving devices and routing methods employed by B. T. Babbitt Co. in manufacture of chlorinated lime, caustic soda, lye, etc.

Shipboard. See SHIPS, Hoisting Apparatus; Unloading.

Shop Transportation. Reducing the Cost of Shop Trucking, Robt. T. Kent. Mgmt. & Administration, vol. 7, no. 3, Mar. 1924, pp. 317-322, 6 figs. Methods which effected big savings in plants where adopted.

Standardization of Equipment. Is Materials Handling Emulating the Automobile Industry? M. W. Potts. Indus. Mgmt. (N. Y.), vol. 67, no. 5, May 1924, pp. 265-271, 11 figs. Review of development of equipment in past years and consideration of new developments and of standard equipment now being produced.

Stone and Clay Industries. Modern Conveying in the Stone and Clay Industries. (Zeitgemässes Förderwesen in der Industrie der Steine und

Erden). Tonindustrie-Zeitung, vol. 48, nos. 78 and 87, Sept. 27 and Oct. 29, 1924, pp. 863-865 and 987-993, 27 figs. Methods and different types of conveyors employed.

Sugar. See CRANES, Traveling; Unloading.

Tie-Treating Plant. Overhead Cranes Serve New Creosoting Plant. Ry. Age, vol. 77, no. 24, Dec. 13, 1924, pp. 1055-1058, 6 figs. Details of improvements designed to increase efficiency, safety and economy in operation embodied in new timber-treating plant of Southern Pac. at Wilmington, Cal.; how ties are handled; creosoting plant; auxiliary facilities.

Unloaders. See UNLOADERS.

Zinc Works. The Handling of Materials at the Risdon Works of the Electrolytic Zinc Co. of Australasia, Ltd., A. W. Cook. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 167-184, 9 figs. Details of handling at 100-ton zinc plant at Risdon covering area of 149 acres with elevation from 6 ft. to 163 ft. above high-water mark.

MATHEMATICS

Circle of Inertia. Mohrs' Circle of Inertia (Ueber den Mohrschen Trägheitskreis), F. Schilling. Bauingenieur, vol. 5, no. 18, Sept. 30, 1924, pp. 576-577, 4 figs. Discusses derivation of Mohrs' circle of inertia and its properties and gives a new derivation with examples.

Elliptic Functions. Practical Use of Elliptical Functions (Utilité pratique des fonctions elliptiques), E. Mathy. Revue Universelle des Mines, vol. 67, no. 5, Mar. 1, 1924, pp. 319-322. Application of elliptical functions to calculation of resistance of materials, and mutual induction of two electric circuits.

Engineering. Mathematics and Engineers (Les mathématiques et les ingenieurs), E. Marcotte. Arts et Métiers, vol. 77, no. 49, Oct. 1924, pp. 361-366. Discusses advantages of mathematics in engineering and gives examples of application of differentials, differential equations and their solution, etc.

Key Equations. Formulation of Key Equations (Die Aufstellung von Schlüsselgleichungen), H. Karll. Schiffbau, vol. 25, no. 24, Sept. 24, 1924, pp. 654-656, 4 figs. Discusses formulation of equations for determining practically, results of processes by graphic trigonometric method.

MATTER

Atoms. See ATOMS.

Electrons. See ELECTRONS.

Ether. See ETHER.

Gravitation. See GRAVITATION; GRAVITY.

Molecular Activation. The Mechanism of Molecular Activation, R. G. W. Norrish. Chem. & Industry, vol. 43, no. 13, Mar. 28, 1924, pp. 327-328. Considers method by which problem of chemical reactivity may be attacked, which may be termed hypothesis of kinetic activation.

MEASUREMENTS

Accuracy in. Limits of Accuracy of Physical Measuring (Ueber die Grenze der physikalischen Messgenauigkeit), W. Block. Zeit. für Instrumentenkunde, vol. 44, no. 8, Aug. 1924, pp. 366-370. Bases of time, length, and mass measurements and their units. Maximum accuracy of length and mass measurements equals 5×10^{-7} and 5×10^{-8}.

C. G. S. System. The Dimension Theory of the Cm-Gram-Sec System (Om cgs-systemets dimensionslära), O. Gallander. Teknisk Tidskrift, vol. 54, no. 36, Sept. 6, 1924, pp. 153-154 (Elektroteknik). A severe criticism of said system and its condemnation as incorrect and unsuitable in modern physical science.

Length. Industrial Length Measures, Standard Measures and Systems of Tolerances (La mesure industrielle des longueurs, Etalons de mesures et systèmes à tolérances), H. Stroh. Génie Civil, vol. 84, nos. 25 and 26, June 21 and 28, 1924, pp. 594-597, 615-617, 12 figs. Discusses length measure in connection with production of good quantities and of interchangeable parts, establishing standards; mechanical precision and systems of tolerances; discusses symmetric and asymmetric tolerances, admissible wear of tolerances; standards for length measures.

See also Machine-Shop; INTERFEROMETERS.

Machine-Shop. Shop Measurements, E. Buckingham. Univ. of Toronto Eng. Soc.—Trans. & Year Book, Apr. 1924, pp. 26-34, and Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 535-538. English and metric standards of length and their interrelation. Accuracy and purposes of shop measurements.

Temperature. See TEMPERATURE MEASUREMENT.

MEASURING INSTRUMENTS

Bibliography. Bibliography for Measuring Instruments With Special Reference to Instruments and Methods of Metrology Used in Mechanical Engineering, F. J. Schlink. Optical Soc. Am.—Jl., vol. 9, no. 3, Sept. 1924, pp. 309-321. Covers general material on physical and mechanical instruments, measurement and production of small linear and angular displacements and distances, vibrations, speeds and time intervals, hysteresis and their relation to instrument design and testing, dynamometers, temperature and humidity, weighing scales, pressure gages, engine indicators, properties and design of springs, etc.

Bridge Loads. The "Ballbox," a New Swedish Device for Measuring Static and Dynamic Reactions at the Supports of Railway Bridges (Die Kugeldose, eine neue schwedische Vorrichtung zur Messung ruhender und dynamischer Auflagerkräfte an Eisenbahnbrücken), Saller. Bautechnik, vol. 2, no. 39, Sept. 12, 1924, pp. 425-426, 3 figs. Details of device consisting of two steel cylinders and a guide bush, the upper cylinder, which carries the load, having a spherical surface which makes a "ball" impression on the lower cylinder, by means of which measurements are calculated.

Electric. See ELECTRIC MEASURING INSTRUMENTS.

End Measuring Machine, Line Standards for. Ruling Line Standards, H. B. Lewis and C. G. Peters. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 796-798, 7 figs. Method of producing line standards free from measurable error by application of light interference, and end measuring machine upon which they are used.

Fluids. Fluid Measuring Devices, D. H. Killeffer. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 785-788, 8 figs. Devices for discontinuous and for continuous measurements; measurement without loss head; indicating mechanisms; recording meters; formulas applicable to flowmeters; measurement of static volume; specific-gravity records.

Gages. See GAGES.

Machine-Shop. Progress in Construction of Measuring Apparatus for the Machine Shop (Neuere Fortschritte im Bau von Messgeräten für den Maschinenbau), J. Geiger. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1020-1023, 7 figs. Difficulties of general introduction of exact measuring instruments; improvements due to quantity production; particulars of torsiograph

adaptable for measuring vibration, acceleration, etc.

Optical. New Optical Measuring Methods for Tool and Machine Construction (Neue optische Messverfahren für den Werkzeug- und Maschinenbau), A. Steinle. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 244-249, 15 figs. New measuring instruments and favorable results obtained with them.

On the Limit of Accuracy in Optical Measurement, A. A. Michelson. Jl. Optical Soc. of Am. & Rev. Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 321-328, 3 figs. Calculations for telescope, microscope, interferometer, and spectroscope.

Planimeter, Polar. The Bencze-Wolf Polar Planimeter (Das Bencze-Wolfsche Fadenpolarplanimeter), K. Oltay. Zeit. für Instrumentenkunde, vol. 44, no. 5, May 1924, pp. 217-229, 11 figs. Note for measuring area of hides and skins, pieces of leather, etc.

Precision. Modern Precision Measuring Instruments, W. L. Whitmarsh. Army Ordnance, vol. 4, no. 24, May-June 1924, pp. 381-384 and 400, 8 figs. Describes standard types, including micrometer caliper, vernier tools, vernier bevel protractor, fluid gage, limit gages, etc., and their functioning and use.

Precision Measuring Instruments Used in Gage Inspection, G. K. Burgess. Army Ordnance, vol. 4, no. 24, May-June 1924, pp. 375-380, 8 figs. Deals with such apparatus as is applied in measurement of dimensions of gages and tools used in manufacture of machine parts, artillery ammunition, etc.

Radium Recording. "Radium" Recording Devices, J. H. Powell. Jl. Sci. Instruments, vol. 1, no. 7, Apr. 1924, pp. 205-209, 5 figs. Describes types of recorder, namely, radiation, luminous paint, and shadow type.

Technical, Germany. Technical Measuring Instruments (Technische Messgeräte), W. Block. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1036-1038. Discusses basic difference of scientific and technical measuring, independence of foreign instruments, simplification of existing instruments, etc.

Thread Recorder. Some Uses of the Thread Recorder in the Measurement of Physical Properties, J. L. Haughton and W. T. Griffiths. Jl. of Sci. Instruments, vol. 1, no. 8, May 1924, pp. 225-233, 9 figs. Methods of employing thread recorder for recording changes of dilation and resistivity of metals and alloys with temperature. Describes also method of combining recorded time-temperature and time-property curves to give a single temperature-property curve.

Torsion Meter. The Moullin Torsion Meter. Engineering, vol. 117, no. 3050, June 13, 1924, pp. 764-765, 12 figs. Apparatus for measuring torque in shafts up to 10 in. diam. and transmitting 1500 hp.

Types. Measuring Devices for Controlling Materials (Die Messgeräte zur Kontrolle der Werkstoffe), G. Berndt. Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1015-1020. Discusses various instruments for measuring quantity, length, profile, area and volume, and mechanic, electric, magnetic, thermic, optic, and chemical properties of materials.

Vibration Recorders. Conditions Which Measuring Instruments Must Satisfy for Determining Dynamic Effect of Vehicles on Steel Bridges (Welche Anforderungen sind an Messgeräte für die Ermittlung der dynamischen Wirkungen von Fahrzeugen an eisernen Brücken zu stellen?), F. Hülsenkamp. Bautechnik, vol. 2, no. 5, Nov. 28, 1924, pp. 575-577, 4 figs. Particulars of Geiger apparatus for recording vibrations, and examples of curves and interpretation.

MECHANICS

Dynamics. See DYNAMICS.

Elasticity. See ELASTICITY.

Inertia. See INERTIA.

"Motor" Calculation. Application of Motor Calculation (Anwendungen der Motorrechnung), R. v. Mises. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 3, June 1924, pp. 193-213, 12 figs. Discusses fundamental equations for rigid bodies, general forms of equations of motion, mechanics of continuity, elastic bar, elastic frame, action and reaction of flowing liquids, etc.

Motor Calculation, a New Expedient of Mechanics (Motorrechnung, ein neues Hilfsmittel der Mechanik), R. v. Mises. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 155-181, 9 figs. Work is divided into three parts, as follows: (1) simplest definitions of addition and multiplication of motors; (2) brief explanation of main points of dyad calculation, that is, definition of dyad conception within ordinary tri-dimensional vector analysis, connecting this with analogous developments for field of motor calculation; (3) practical examples of applications of new principles and formulas.

Radially-Loaded Arc. The Stability of an Arc under Uniform Radial Pressure (Ueber die Stabilität eines Kreisbogens unter gleichmässigem radialem Druck), P. Funk. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 143-146, 1 fig. Calculation of buckling load under influence of radial pressure.

MECHANISMS

Intermittent-Motion. Intermittent Motion Mechanism, A. W. Harris. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 301-304, 6 figs. Describes intermittent movement which is not only of rotary type, but will give any variation of intermittent motion that may be required; design for starting one mechanism the instant another stops; arrangement for prolonged rest periods; application to automatic machine.

Kinematic Study of. See MACHINE DESIGN, Kinematic Study of Mechanisms.

MENSURATION

Simpson's Rules. Simpson's Rules Generalized, W. F. Durand. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 885-886, 5 figs. Deals with Simpson's rules for finding areas bounded by irregular curve.

MERCURY

Boiler. See BOILERS, Mercury-Vapor.

Compressibility. Equation of State and Compressibility of Mercury (Die Zustandsgleichung und Kompressibilität des Quecksilbers), K. K. Järvinen. Zeit. für Physikalische Chemie, vol. 109, nos. 3-4, May 5, 1924, pp. 275-286, 1 fig.

New Zealand. The Action of Light on Cinnabar, W. H. Cropp. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 259-266. Discusses occurrence at Puhipubi, No. Auckland; fresh ore exposed to direct sunlight rapidly changes color from delicate pinks and brilliant reds to shades of translucent bluish-gray.

Quicksilver Production, 1923. Quicksilver in 1923, C. P. Ross. U. S. Geol. Survey (Mineral Resources of U. S.), nos. I:4, Sept. 29, 1924, pp. 35-46. Production; methods of production; prices; imports and exports; uses; mining industry by states; bibliography.

Resources. Report of the Sub-Committee on Quicksilver. Min. & Met. Soc. of America, vol. 17, no. 4, Apr. 1924, pp. 97-105, 2 figs. Report of sub-committee as to bases for formulation of laws and agreements affecting natural resources.

MERCURY-VAPOR PROCESS

Boiler Employing. See BOILERS, Mercury-Vapor.

Principles and Applications. Mercury Vapor as an Industrial Heating Medium, C. Field. Chem. & Met. Eng., vol. 30, no. 25, June 23, 1924, pp. 987-991, 8 figs. Outline of system, with discussion of various other sources of heat at high temperature available for industrial use.

METAL DRAWING

Dies for. See DIES, Drawing.

Shells. Drawing Double-walled Steel Shells, R. B. Hickey. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 592-594, 4 figs. Describes dies employed in production of steel shells used in connection with an auxiliary mechanism of an a.c. motor and generally known as "spring barrel tubes," and press operations required in blanking, drawing, redrawing and forming shells.

Unusual Metal Drawing. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 588-589, 4 figs. Describes drawing operation of shell having a straight hole and a tapered exterior, metal being comparatively thin at closed end and thickening toward open end; made from open-hearth hot-rolled dead-soft steel, and sheets are well oiled.

METAL FURNITURE

Manufacture. Sheet Metal Furniture, W. Scholl. Sheet Metal Worker, vol. 15, no. 17, Sept. 12, 1924, pp. 644-645, 6 figs. Deals with manufacture. How to design and make plain sheet-metal tables and desks.

METAL SPRAYING

Capabilities and Applications. Metal Spraying and Sprayed Metal, T. H. Turner and W. E. Ballard. Inst. of Metals—Advance Paper no. 14, for meeting Sept. 8-11, 1924, 17 pp., 25 figs. on supp. plates. Indicates critically actual capabilities of metal spraying as now practiced in England and other countries. Investigation includes examination of history of process and of its present capabilities and applications. Bibliography.

Schoop Process. Metallisation. Machy. (Lond.), vol. 24, no. 621, Aug. 21, 1924, pp. 641-644, 5 figs. Schoop process of depositing metals on metal or other material surfaces.

METALLIZATION. See METAL SPRAYING.

METALLOGRAPHY

Applications. Practical Metallography, S. P. Rockwell. Am. Mach., vol. 61, no. 13, Sept. 25, 1924, pp. 487-492, 18 figs. Applications of art of metallography to solution of problems in average plant. Practical methods of procedure. Illustrated studies of various examples.

Bibliographies. Bibliographies. Gen. Elec. Rev., vol. 27, no. 7, July 1924, pp. 456-458. Prepared by O. E. Harder, Dept. Metallography, Minn. School Mines, Univ. Minn. X-rays and metals; atoms, space lattice, solid solutions, etc.; slip interference theory of hardening.

Condenser Tubes. See CONDENSERS, STEAM, Tubes.

Conical Illumination in. Conical Illumination in Metallography, H. S. George. Iron Age, vol. 113, no. 6, Feb. 7, 1924, pp. 426-430, 12 figs. New method of illuminating opaque objects obliquely; practical application and advantages.

Heat Etching. Criticism of Metallographic "Heat Etching" (Zur Kritik der metallographischen Heissätzung), F. Sauerwald, W. Schultze and G. Jackwirth. Zeit. für anorganische u. allgemeine Chemie, vol. 140, no. 4, Nov. 17, 1924, pp. 384-390, 5 figs. on supp. plate. Investigates nature of "etching" of polished metallic specimens, especially those of iron and steel, in fused salt bath or in indifferent gas; it appears that development of structure by heat etching is not due to any specific action of etching reagent, but to changes in metal itself; draws attention to danger of decarbonization of steel by prolonged annealing in sodium-potassium chloride salt bath and to possibility of impurities in bath causing considerable changes in grain structure.

Lehigh University. Metallography at Lehigh University, H. B. Pulsifer. Forging—Stamping—Heat Treating, vol. 10, no. 7, July 1924, pp. 276-278, 7 figs. Leading engineering colleges are coming to recognize metallography as most important of the aspects commonly assembled under metallurgy.

Macrography. See METALS, Macrography.

Microscopes for. See MICROSCOPES, Metallographic Work.

Photomicrography. See METALS, Photomicrography of.

Polarized Light. Metallography in Polarized Light (Metallographie im polarisierten Licht), L. C. Glaser. Zeit. für technische Physik, vol. 5, no. 6, 1924, pp. 253-260, 12 figs. Discusses various methods of employing polarized light for metallography; gives details of various optical arrangements and shows colored photographs of phosphor-bronze, phosphor-tin alloys, taken in polarized light; by means of photometric method it is possible to determine reflection constants and anisotropic properties of various constituents of an alloy.

Simulating Natural Light in. Simulating Natural Light in Metallography, H. S. George. Am. Inst. Min. & Met. Engrs.—Trans., no. 1333-S, Mar. 1924, 15 pp., 16 figs. Method of illumination that enhances value of microscopic study of opaque materials, as in metallography; example is included of revelation of hitherto invisible microconstituent.

Specimens, Preparation of. Preparation of Metallographic Specimens, J. D. Gat. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1924, pp. 536-541, 7 figs. Compilation of definite facts and rules which will enable an investigator to prepare satisfactory specimens.

Transparent. Transparent Metallography, L. V. Foster. Am. Soc. Steel Treating—Trans., vol. 5, no. 4, Apr. 1924, pp. 413-419, 8 figs. Method of preparing transparent specimens of polished and etched metal surfaces; specimen containing finest structure prepared in described way and observed by means of dark-field illumination renders visible all detail present in metal specimen.

METALLURGICAL WORKS

Accidents. Accidents at Metallurgical Works in the United States During the Calendar Year 1922, W. W. Adams. U. S. Bur. Mines—Technical Paper 350, 1923. 31 pp. Statistics representing entire metallurgical industry, except iron blast-furnace plants.

Labor-Saving Equipment. Labor Saving Machinery Adopted, G. H. Charls. Iron Trade Rev., vol. 74, no. 24, June 12, 1924, pp. 1563-1564. Devices used in various departments of coke plants, blast furnaces, steel works and rolling mills to augment production and reduce costs.

METALLURGY

Amalgamation. See METALS, Amalgamation.

Developments. Developments in Metallurgy, S. B. Goodale. Blast Furnace & Steel Plant, vol. 12, no. 2, Feb. 1924, pp. 109-112. Review of investigational work being carried on by various agencies.

Development of the Freiberg Metallurgical Industry (Die Entwicklung des Freiberger Hüttenwesens), M. Schütz. Metall u. Erz, vol. 21, no. 12, June 2, 1924, pp. 261-264. Discusses successive developments and introduction of new processes between 1847-1923.

Education in. See EDUCATION, ENGINEERING, Metallurgy.

Electrometallurgical Development. See ELECTROMETALLURGY, Developments.

Electrometallurgy. See ELECTROMETALLURGY.

Electrometric Titration. Electrometric Titration: An Investigation of Its Methods and Application to Certain Metallurgical Analyses, G. A. Shires. Chem., Met. & Min. Soc. of S. Africa —Jl., vol. 24, no. 6, Dec. 1923, pp. 129-145, 8 figs. Detailed study of principles and methods involved, with view to acquiring familiarity with subject, and to determine practicability, or otherwise, of its employment in number of instances of metallurgical importance. Bibliography.

Hydrometallurgy. The Advantageous Use of Continuous Operation, J. V. N. Dorr. Chem. & Met. Eng., vol. 31, no. 12, Sept. 22, 1924, pp. 463-464. Developments in use of hydrometallurgical equipment for continuous mixing and decantation that result in more economical methods of production. Abstract from paper read before Am. Inst. Chem. Engrs.

Non-Ferrous. Progress in Metallurgical Production of the Most Important Metals During and Since the War (Fortschritte der hüttenmännischen Gewinnungsverfahren der wichtigsten Metalle während des Krieges und nach dem Kriege), K. L. Meissner. Zeit. für angewandte Chemie, vol. 37, no. 1, Jan. 3, 1924, pp. 1-4. Deals with metallurgy of copper, zinc and lead.

Some Impressions of American Non-Ferrous Metallurgy, W. Rosenhain. British Non-Ferrous Metals Research Assn.—Bul., no. 11, Jan. 1924, pp. 5-18. Impressions received from a visit made to America; brief account of works visited and methods observed.

Oxygenated Air, Use in. Use of Oxygenated Air in Metallurgical Operations. Am. Inst. Min. & Met. Engrs.—Symposium Abstracts, no. 1377-S, Nov. 1924, 119 pp., 16 figs. Abstracts of papers forming symposium, as follows: Summary of committee report and discussion; Enriched Air in Metallurgy, W. S. Landis; Application of Oxygen-enriched Air in the Blast Furnace, T. L. Joseph; Use of Oxygenated Air in the Blast Furnace, A. G. McKee; Use of Oxygenated Air in the Iron Blast Furnace, Chas. Hart; Proposed Use of Oxygen in the Openhearth Furnace, S. Cornell; Use of Oxygen in the Gasification of Coal, W. Dyrssen; Cheap Oxygen in Metallurgy, E. B. Kirby; Tabulated Thermal Effects of Use of Oxygenated Air, C. S. Witherell; Discussion on Use of Oxygenated Air in Metallurgical Operations; Effect of Oxygen-enriched Air in Roasting Zinc Ores.

Papers on. Practical Points from the Fourth Congress of Industrial Chemistry (Les indications pratiques du IV^{e} Congrès de Chimie Industrielle), Ch. Berthelot. Revue de Métallurgie, vol. 21, no. 11, Nov. 1924, pp. 686-701, 5 figs. Principal particulars of papers presented, especially regarding fuels, metallurgy, and ceramic industry. Bibliography.

Russia. Second Russian Congress on Scientific Metallurgy (Le 2^{e} Congrès de Métallurgie scientifique russe), L. Dlougatch. Chaleur & Industrie, vol. 5, no. 52, Aug. 1924, pp. 386-388, 4 figs., and Revue de Métallurgie, vol. 21, no. 11, Nov. 1924, pp. 702-705. Details of Leningrad Congress, May 25 to June 2. Review of papers presented, including production of iron and its alloys, production of copper and its alloys, electrometallurgy, metallography, etc.

Theory of Equilibrium, Application of. Application of the Theory of Equilibrium to Metallurgical Questions (Die Anwendung der Gleichgewichtslehre auf metallurgische Fragen), W. Heike. Metall u. Erz, vol. 21, no. 20, Oct. 2, 1924, pp. 469-482, 24 figs. Discusses behavior of bismuth in Pattison process; explains desilvering of lead by addition of zinc (Parkes process); discusses ternary equilibrium system in question; etc.

X-Ray Crystal Analysis. See CRYSTALS, X-Ray Analysis.

METALS

Acetone and Methanol, Action of. Metals for Use in Handling Organic Solvents, R. F. Remler. Chem. & Met. Eng., vol. 30, no. 13, Mar. 31, 1924, pp. 511-512, 6 figs. Action of acetone and methanol on metals used in chemical-engineering equipment.

Acoustic Testing. Change of Sound Figures of Rolled Sheets on Recrystallization (Ueber die Aenderung der Klangfiguren auf Walzblechen bei ihrer Rekristallisation), E. Schröder and G. Tammann. Zeit. für Metallkunde, vol. 16, no. 6, June 1924, pp. 201-206, 13 figs. Discusses acoustic process of testing work pieces, gives sound figures of elastic isotropic and anisotropic disks, change of sound figures in recrystallized copper, zinc, and aluminum-bronzes.

Amalgamation. Difficulties of Intensive Amalgamation, L. M. Kellogg. Eng. & Min. Jl.-Press, vol. 117, no. 24, June 14, 1924, pp. 966-969, 2 figs. Fundamental principles or conditions which amalgamators should meet; brief description of a few typical devices; why many devices have been unsuccessful; a suggested form of machine that has given good results in test work.

Analysis of. See CHEMICAL ANALYSIS, Metals, Methods for.

Attack by Acids. How are Metals Attacked by Acids? (Wie werden Metalle von Säuren angegriffen?), R. Gans. Zeit. für Physikalische Chemie, vol. 109, nos. 1-2, Apr. 12, 1924, pp. 49-64, 7 figs. Results of experiments with Au-Ag and HNO_3, and Ag and H_2S to determine time and manner of attack.

Brinell-Tensile Relationship. Experiments on the Brinell-Tensile Relationship, A. L. Norbury and T. Samuel. Iron & Steel Inst.—Advance Paper, no. 12, for meeting May 1924, 11 pp., 4 figs. Tensile, Brinell, and scleroscope tests on materials used; plotting of results according to Meyer's formula; comparison of Brinell and tensile results.

Brittleness. Brittleness, W. R. Barclay. Metal Industry (Lond.), vol. 24, no. 7, Feb. 15, 1924, pp. 151-162 and 158. Causes and types of brittleness; its relation to toughness, ductility, plasticity, and crystal structure.

Casting. See CASTING.

Casting and Molding, Patents for. Casting and Moulding Metals. Abridgments of Specifications (Lond.), Class 83 (i), Period 1916-20, 1924, 116 pp. Patents for inventions.

Cementation. See CEMENTATION.

Cleaning. Metal Cleansing with Alkaline Cleaning Solutions, E. M. Baker and R. Schneidewind.

Am. Electrochem. Soc.—Advance Paper, no. 15, for meeting, Apr. 24-26, 1924, pp. 203-229, 11 figs. Typical analyses of cleaners used for various purposes, and factors entering into mixing of cleaners.

Modern Methods of Cleaning Metals. Metal Industry (N. Y.), vol. 22, no. 10, Oct. 1924, pp. 402-404, 5 figs. How application of modern machinery and volume-production methods has lowered costs in metal-cleaning department and insured uniformly · thorough work.

Cold Working. Effect of Severe Cold Working on Scratch and Brinell Hardness, H. S. Rawdon and W. H. Mutchler. Am. Inst. Min. & Met. Engrs.—Trans., no. 1291-N, Jan. 1924, 11 pp., 7 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, p. 31. Results obtained when a series of metals, copper, iron, tin, etc., were cold rolled to a definite degree without any intermediate annealing and hardness determined by both scratch and Brinell methods. Discussion in A. I. M. E. Trans., no. 1340-N, May 1924, pp. 3-14, 4 figs.

Interpretation of Cold Working on the Basis of Electric Measurements (Zur Deutung der Kaltbearbeitung auf Grund elektrischer Messungen), W. Geiss and J. A. M. vanLiempt. Zeit. für Anorganische und Allgemeine Chemie, vol. 133, no. 1, Feb. 11, 1924, pp. 107-112. Discusses deformation of metal crystals in cold working and current hypotheses; application of X-ray analysis and its limitations.

Compressing Powdered. The Production of Synthetic Metal Bodies through Compression or Sintering (Die Herstellung synthetischer Metallkörper durch Druck oder Sinterung), F. Sauerwald. Zeit. für Metallkunde, vol. 16, no. 2, Feb. 1924, pp. 41-46, 4 figs. Discusses internal processes occurring with pressing of powder and heat treatment of pressed material as basis for further research.

Corrosion. Notes on Corrosion Testing by Different Immersion Methods, H. S. Rawdon and A. I. Krynitsky. Am. Electrochem. Soc.—Advance Paper no. 20, for meeting Oct. 2-4, 1924, pp. 273-286, 5 figs. Need for choosing a corrosion test which shall in some measure approximate service conditions is emphasized and illustrated by reference to an unusual case of corrosion in a submarine cable; general types of immersion tests; comparative results of immersion tests on chromium steels. Pub. by permission U. S. Bur. Standards.

The Corrosion and Decay of Metals and Alloys, E. G. Jarvis. Brass Wld., vol. 20, no. 10, Oct. 1924, pp. 339-341. Discusses season cracking, types of alloy corrosion, etc.; conclusions of experiments with sea water.

The Micro-Chemistry of Corrosion, C. H. Desch. Am. Electrochem. Soc.—Advance Paper no. 18, for meeting Oct. 2-4, 1924, pp. 251-256. Description of apparatus employed in a microscopical study of early stages of corrosion and of method of testing alloys.

See also CORROSION, Metallic; Prevention.

Corrosive Agents, Behavior Under Action of. How Metals Stand Up Against Corrosion. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1294, pp. 70-79. General and specific data from many sources on behavior of iron and steel, copper, aluminum, lead, nickel, tin, and zinc, under action of many destructive agencies encountered in industrial world.

Cutting. See CUTTING METALS.

Deformation. New Research in the Field of Deformation of Metals (Neue Forschungen auf dem Gebiete der Verfestigung der Metalle). Gewerbefleiss, vol. 103, nos. 8 and 9, Aug. and Sept. 1924, pp. 134-139 and 145-150, 23 figs. Discusses results of Czochralski's experiments to prove his theory that deformation beyond elastic limit is due to displacement of particles by any fractional parts of atomic distances, so that a series of atoms originally in straight line may form a continuous curve.

Torsional Tests of Metals, Elastic and Permanent Deformation (Les essais de torsion des métaux, déformations élastiques et déformations permanentes), J. Seigle and F. Cretin. Génie Civil, vol. 84, nos. 23 and 24, June 7 and 14, 1924, pp. 545-549 and 565-568, 19 figs. Describes apparatus used; studies angles of torsion, torsion curves for elastic and permanent deformation, elastic limit of torsion, etc.

Density Determination. See IRON, Density, Determination of.

Desulphurization. Sulphurization and Desulphurization of Metals by Means of Slag or Basic Slag (Sulfuration et désulfuration des métaux par les scories ou laitiers basiques), M. B. Bogitch. Revue de Métallurgie, vol. 21, no. 11, Nov. 1924, pp. 682-685. Discusses methods of desulphurization of metal in fused and in solid state, and production of matte.

Diffusion. Diffusion in Solid Metals (Die Diffusion in Metallen in festem Zustand), W. Geiss and J. A. M. v. Liempt. Zeit. für Metallkunde, vol. 16, no. 8, Aug. 1924, pp. 317-318, 2 figs. A single crystal made up by depositing successive layers of molybdenum and tungsten on small crystal of latter underwent no change on heating for 3 hours at 2400 deg., whereas with intimate mixture of small crystals of the two elements pressed into bar a complete solid solution was obtained after 15 min. at 2400 deg. and appreciable diffusion had taken place after 1 hour at 1300 deg.; a smooth tungsten rod heated in pure carbon commenced to absorb carbon at 1550 deg. with formation of carbide, but no carbon was absorbed by a single crystal of tungsten under similar conditions even after 3 hours at 1900 deg.

The Trend in the Science of Metals, Z. Jeffries. Am. Inst. Min. & Met. Engrs.—Trans., Advance paper no. 1337-N, May 1924, 23 pp., 23 figs. Discusses diffusion in solid state and plasticity of metals.

Drawing. See METAL DRAWING.

Elastic and Fatigue Limits. Elastic and Fatigue Limits in Metals, B. P. Haigh. Birmingham Met. Soc.—Jl., vol. 8, no. 9, Feb. 1924, pp. 412-422 and (discussion) 423-424, 8 figs., partly on supp. plate. Proving and research tests; tensile test as a basis of design; safe stress as a fraction of ultimate tension strength; measurement of fatigue limit; different elastic limits for different kinds of stress.

Elasticity of, Measurement. Further Contribution to Dynamic Measurement of Elasticity in Metals and Alloys (Weiterer Beitrag zur dynamischen Elastizitätsmessung an Metallen und Legierungen), G. Welter. Zeit. für Metallkunde, vol. 16, no. 6, June 1924, pp. 213-220, 24 figs. Describes new testing method for determining impact-elongation elasticity; effect of falling weight on dynamic limit of elasticity; compares dynamic and static elongation test.

Electric Conductivity. Electric Conductivity of Metals (Zur elektrischen Leitfähigkeit der Metalle), F. Simon. Zeit. für Physik, vol. 27, no. 3, 1924, pp. 157-163. Shows that change in electric conductivity of metals may be explained also for liquid state by change in the frequency number of oscillations of atoms.

See also ELECTRIC CONDUCTIVITY, Metals.

Electric Resistance. See ELECTRIC RESISTANCE.

Electrodeposited, Hardness of. The Hardness of Electro-Deposited Iron, Nickel, Cobalt and

Copper, D. J. Macnaughtan. Iron & Steel Inst. —Advance Paper no. 11, for meeting May 1924, 16 pp., 4 figs. Experimental work is attempt to correlate from results of number of experiments Brinell hardness, microstructure, and conditions of production of certain deposits of iron, nickel, cobalt and copper; consideration of possible causes of range of hardness obtained.

Electrodeposition. Dry Ionoplating or Galvanoplating (L'ionoplastie ou galvanoplastie par voie sèche), L. Houllevigue. Technique Moderne, vol. 16, no. 12, June 15, 1924, pp. 414-420, 14 figs. Electric deposition in rarefied air of metals used as cathodes on conducting or insulating surfaces for production of metallic reflecting surfaces, for great electric resistance, ornamentation, etc.

Electrolytic Analysis. Rapid Electrolytic Analysis in an Apparatus with a Rotating Anode (Appareil à anode rotative pour l'analyse électrolytique rapide), Bertiaux. Société Chimique de France—Bul., vol. 35-36, no. 8, Aug. 1924, pp. 1030-1039, 6 figs. Analysis is carried out in cell in which perforated cylindrical anode of platinum-iridium alloy is rotated within fixed cathode of similar shape and material.

Electrolytic Shaping and Molding. The Electrolytic Shaping and Molding of Articles from Very Hard Metallic Materials (Elektrolytische Formgebung von harten metallischen Gegenständen), M. Pirani and K. Schröter. Zeit. für Metallkunde, vol. 16, no. 4, Apr. 1924, pp. 132-133, 5 figs. Process consists in employment of sodium or potassium hydrate as attacking agent, with suitable form of anode to accomplish work desired, and use of some insulating liquid in order to protect those parts of object which it is desired to maintain free from electrolytic action; boring and hollowing operations are given as examples of this method, but practically any shaping or molding work can be carried out.

Electron Emission from Films. The X-Ray Emission of Electrons from Metal Films, with Special Reference to the Region of the Absorption Limit, L. Simons. Physical Soc. Lond.—Proc., vol. 37, no. 206, Dec. 15, 1924, pp. 58-71 (includes discussion), 4 figs. Problem presented by selective absorption and ionization; separation of beta and delta rays; properties of beta rays in region of absorption band; etc.

Electrons in, Thermal Energy of. The Thermal Energy of Electrons in Metals, E. D. Eastman, A. M. Williams, and T. F. Young. Am. Chem. Soc.—Jl., vol. 46, no. 5, May 1924, pp. 1184-1196, 3 figs. Data and results of a general survey made.

Endurance of. Correlation of Endurance Properties of Metals, D. J. McAdam, Jr. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 393-395. Summary of paper presented by permission of Secretary of Navy.

The Evidence for the Existence of an Endurance or "Fatigue" Limit in Metals and Its Determination, H. F. Moore and T. M. Jasper. Engineering, vol. 118, nos. 3069 and 3071, Oct. 24 and Nov. 7, 1924, pp. 580-582 and 658-660, 12 figs. S-N diagram and endurance limit; elastic limit and its limitations; mechanism of fatigue breakdown of metal; tests for endurance limit and fatigue strength; summary of machines and test methods used in investigation at Univ. of Ill.

See also Elastic and Fatigue Limits; Fatigue.

Equilibrium Diagrams. The Application of the Ideal Solubility Curve to the Interpretation of Equilibrium Diagrams in Metal Systems, D. H. Andrews and J. Johnston. Inst. of Metals—Advance Paper no. 2, for meeting Sept. 8-11, 1924, 20 pp., 5 figs. Points out applicability of certain deductions, from laws of ideal solution, to phase equilibria in metal systems, and shows practical usefulness of these theoretical relations in aiding us to assess and interpret experimental data.

Expansion, Coefficients of. Determination of the Thermal Coefficients of Expansion of Some Commercial Metals and Alloys, J. N. Friend and R. H. Vallance. Inst. Metals—Advance Paper, no. 5, for meeting Mar. 12-13, 1924, 4 pp. Describes apparatus used and results obtained.

Extrusion of. See EXTRUSION OF METALS.

Fatigue of. An Investigation of the Fatigue of Metals, H. F. Moore and T. M. Jasper. University of Ill.—Bul., vol. 21, no. 39, May 26, 1924, 86 pp., 22 figs. Theory of fatigue of metals; evidence of existence of endurance limit for wrought ferrous metals and of improvement in strength of such metals by cycles of reversed stress at or below that limit; resistance to reversed axial stress (tension-compression); miscellaneous tests and results; resistance to repeated stress other than reversed stress. Bibliography.

Fatigue in Metals, H. J. Gough. Iron & Coal Trades Rev., vol. 109, no. 2963, Dec. 12, 1924, p. 963. Also Foundry Trade Jl., vol. 30, no. 435, Dec. 18, 1924, pp. 527-528. Types of stresses and tests, effect of speed, effect of surface scratches, and effect of stresses upon microstructure of metals. (Abstract.) Lecture before Brit. Acetylene & Welding Assn.

Fatigue Phenomena and Endurance Tests (Ermüdungserscheinungen und Dauerversuche), R. Mailänder. Stahl u. Eisen, vol. 44, nos. 21, 22, 23, 24, and 25, May 22, 29, June 5, 12, and 19, 1924, pp. 585-589, 624-629, 657, 661, 684-691, and 719-725, 31 figs. Summarized report of investigations up to end of 1923. Determination of working strength; machines and arrangements for endurance tests; notch action; deformation and hysteresis; fracture. Relations between strength and varying load, various ways of loading, change in strength due to sustained tests, effect of cold working and annealing, composition, structure, etc. Bibliography.

The Investigation of a Fatigue Failure of Brass Tubes in a Feed-Water Heater, with a Consideration of the Nature of "Fatigue," W. E. W. Millington and F. C. Thompson. Inst. Metals—Advance Paper, no. 11, for meeting March 12-13, 1924, 23 pp. 18 figs. Description of failure; effects of mechanical deformation on close-packed cubic crystal; compares new theory of authors—that straight markings are cause of embrittlement which lead to fracture—with actually observed facts.

The Work of the Fatigue Panel of the Aeronautical Research Committee, C. F. Jenkin. Engineering, vol. 118, no. 3059, Aug. 15, 1924, p. 245. Describes nature of problem that panel appointed to investigate problem of fatigue in metals is endeavoring to solve and the various lines of investigation which are being followed.

Grain Growth. See Recrystallization.

Hall Effect and Thermo-Force. The Hall Effect and Thermo-Force (Halleffekt und Thermokraft), R. Raethjen. Physikalische Zeit., vol. 25, no. 4, Feb. 15, 1924, pp. 84-89, 1 fig. Equation based upon classical electron theory for Hall effect is combined with thermo-force equation; measurements made on silver, gold, platinum, copper, aluminum, tin, and palladium hydrogen, show that equation does not hold even approximately.

Hardness, Determination of. See HARDNESS, Brinell Ball Testing Method.

Hardness Numbers. Hardness Numbers and Their Relation, H. P. Hollnagel. Iron Age, vol. 114, no. 22, Nov. 27, 1924, pp. 1404-1406, 5 figs. Absence of real basis for comparison; structure of metals; ideal physical state; true hardness.

Heat Conductivity. A New Application of the Bar Method for the Measurement of Thermal Conductivity, M. D. O'Day. Jl. Optical Soc. Am. & Rev. of Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 245-254, 5 figs. Description of electrically-

heated bar method of measurement; describes test to find conductivity of lead and tin; Thomson effect.

Heat Conductivity of Technically Important Metals and Alloys (Die Wärmeleitfähigkeit technisch wichtiger Metalle und Legierungen), M. Jakob. Zeit. für Metallkunde, vol. 16, no. 9, Sept. 1924, pp. 353-358. Most probable values of heat conductivity of number of metals and alloys at different temperatures have been collected from work of many investigators for incorporation in newest Landolt-Börnstein tables; heat conductivity of most metals decreases between —180 and 0 deg., then increases again with further rise of temperature; in case of alloys, however, heat conductivity increases constantly with rise of temperature; nickel and aluminum appear to be exceptional.

Heat Transmission in. Calorific Conductivity of Metals and Alloys of Importance in Technical Application (La conductibilité calorifique des métaux et alliages presentant de l'importance pour les applications techniques), M. Jakob. Chaleur & Industrie, vol. 5, no. 55, Nov. 1924, pp. 557-563. Data on heat transmission by aluminum, copper, tin, iron, zinc, and their alloys.

Heat Treatment. The Heat Treatment of Metals, E. Pull. Machy. Market, nos. 1208 and 1209, Dec. 28, 1923 and Jan. 4, 1924, pp. 27-28 and 25-26, 3 figs. Definitions of words and phrases in general use in connection with annealing, hardening, and tempering.

Heats of Oxidation, Determination of. A Redetermination of the Heats of Oxidation of Certain Metals, J. E. Moose and S. W. Parr. Am. Chem. Soc.—Jl., vol. 46, no. 12, Dec. 1924, pp. 2656-2661, 2 figs. Methods and apparatus employed and results obtained in determination of heat of oxidation of aluminum, beryllium, cerium, cadmium, lanthanum, magnesium, molybdenum, tantalum, tin, tungsten, and zinc.

Hydrogen Overvoltage and Properties. The Hydrogen Overvoltage of Metals and Their Characteristic Properties, E. J. Weeks. Chem. News, vol. 128, no. 3347, June 6, 1924, pp. 359-360. Overvoltage and valency.

Impact Resistance. Elastic Impact Resistance of Metals and Alloys (Schlagelastizität von Metallen und Legierungen), Geo. Welter. Zeit. für Metallkunde, vol. 16, no. 1, Jan. 1924, pp. 6-11, 13 figs. In author's opinion elastic behavior of materials under dynamic stress is of greatest importance in dimensioning of machine parts and other constructions; describes new method of determining impact elasticity limit of metals and determines according to this method range of permissible permanent stress for aluminum, electrolytic copper, brass, iron, and hardened aluminum alloys; influence of notches is taken into consideration.

Impact Testing. See IMPACT TESTING.

Internal Structure. The Relationship between Mechanical Treatment and Internal Structure of Metals, F. Johnson. Birmingham Met. Soc.—Jl., vol. 8, no. 11, July 1924, pp. 479-496, 14 figs. Constitution of atoms; inter-atomic forces; plastic deformation; twinning in metals; slip-interference theory of hardening of metals; relation between grain size and strength; critical range of deformation; hardness of solid solutions; allows of duplex structure.

Light. See AIRCRAFT CONSTRUCTION MATERIALS, Light Metals.

Liquid Mixtures. Behavior of Liquid Cuprous Sulphide, Ferrous Sulphide, Copper and Iron (Das Verhalten von flüssigen Cu_2S, FeS, Cu and Fe), G. Tammann and H. Bohner. Zeit. für anorganische u. allgemeine Chemie, vol. 135, no. 3, May 21, 1924, pp. 161-168, 2 figs. Since at certain concentrations mixtures of liquid copper and cuprous sulphide and of iron and copper are immiscible, diagram shows existence of area in which three layers are formed instead of two, one of sulphide and two metallic; significance of this region is discussed; analysis of layers formed by melting together equivalent amounts of iron and cuprous sulphide shows that copper and iron are divided practically equally between metal and sulphide layers.

Machining Qualities. A Method for Determining the Resistance of Metals to Drilling and Its Application to the Investigation of the Machinability of Metals, A. Kessner. Testing, vol. 1, no. 4, Apr. 1924, pp. 270-285, 11 figs. Describes drilling testing machine; some investigations carried out by means of Kessner machinability testing machine; standard comparison metals for drilling tests.

Macrography. New Process of Metal Macrography by Direct Impression on Films (Nouveau procédé de macrographie des métaux par impression directs sur pellicule), J. Durand. Génie Civil, vol. 85, no. 6, Aug. 9, 1924, pp. 131-133, 6 figs. Discusses direct examination of metals more or less polished and etched with reagent as part of acceptance test, giving details especially of segregations, deformations due to working, solidification, and effect of any factor modifying the structure.

Melting, Fluxes and Slags in. Fluxes and Slags in Metal Melting and Working. Foundry Trade Jl., vol. 29, nos. 402 and 403, May 1 and 8, 1924, pp. 359-363 and 388-390. See also Metal Industry (Lond.), vol. 25, no. 5, Aug. 1, 1924, pp. 101-102. Abstracts of papers read at a general discussion on this subject which was held Apr. 28, 1924, at Instn. Mech. Engrs., under joint auspices of Faraday Soc., Inst. Metals, Inst. British Foundrymen, and British Non-Ferrous Research Assn., viz.: Oxidizing Fluxes in Melting of Non-Ferrous Metals, A. Portevin; Use of Fluxes in Brass Melting, R. Genders and M. A. Haughton; Note on Slags From Lead, Copper, and Other Blast Furnaces, G. Rigg; Slags Produced in Melting Silver Alloys, J. Phelps; Sulphurizing and Desulphurizing of Metals by Basic Slags and Fluxes, B. Bogitch; Slag Inclusions in Relation to Fatigue, B. P. Haigh; Fluxing Problems in Welding Mild Steel With Metallic Arc, H. Ogden; Physical Chemistry of Slags and Fluxes in Non-Ferrous Metal Industries, C. H. Desch; Fluxes and Slags in Oxy-Acetylene Welding, C. C. Smith.

Melting by N. D. Gas and Other Fuels, A. J. Smith. Metal Industry (Lond.), vol. 25, no. 1, July 4, 1924, pp. 1-2. Author gives figures comparing different systems of melting that have come within his experience.

Melting-Temperature Determination. Determining the Temperature of Melts (Ueber die Temperaturbestimmung in Metallschmelzen), M. Moeller. Giesserei-Zeitung, vol. 21, no. 20, Oct. 15, 1924, pp. 442-443, 3 figs. Discusses difficulties and describes a new immersion pyrometer.

The Temperature Determination of Molten Metals, R. L. Binney and N. I. Terbille. Metal Industry (N. Y.), vol. 22, no. 5, May 1924, pp. 189-190. A combination of base metal and rare metal couples which proved trustworthy in brass foundry.

Microstructure. Anomalies in Metals Disclosed by the Metallographic Microscope (Le anamalie dei metalli rilevate dal microscopio metallografico), V. Prever. Ingegneria, vol. 3, nos. 6 and 8, June 1 and Aug. 1, 1924, pp. 196-200 and 273-278, 38 figs. Discusses size of grain, annealing and cooling, and effect on microstructure and properties; heterogenous inclusions, cavities, impurities, abnormal thermal conditions, etc.

Molecular Slip. Gliding Surfaces Forming in Solid Bodies Under Load (Ueber die unter einer Belastung sich bildenden Gleitflächen der festen Körper), A. Nádai. Zeit. für technische Physik,

vol. 5, no. 9, 1924, pp. 369-378, 103 figs. partly on supp. plates. Discusses compression and tensile strength tests; flow figure of metals; molecular slip in metals under load; torsion. Results of tests shown in micrographs.

Non-Ferrous. See NON-FERROUS METALS.

Non-Metallic Inclusions in. A Note on Non-Metallic Inclusions in Metals, with Special Reference to Aluminium, A. G. Lobley. Foundry Trade Jl., vol. 30, no. 412, July 10, 1924, p. 34. Discusses cryolite present in aluminum, nitrogen, carbon, and aluminum; states that electric remelting is not harmful. Abstract of paper read at symposium on Slags and Fluxes, arranged by Faraday Soc., Inst. of Metals, Inst. of British Foundrymen and Non-Ferrous Research Assn.

Notch Action, Reduction of. New Ways of Reducing Notch Action (Neue Wege zur Herabsetzung der Kerbwirkung), H. Kändler. Zeit. für technische Physik, vol. 5, no. 4, 1924, pp. 150-154, 7 figs. Influence of acid etching on notches in metal surfaces; etching of notches in chrome-nickel steel; increasing life of rods by etching treatment.

Partition Coefficients. Partition of a Metal between Two Liquid Metallic Phases (Ueber die Verteilung eines Metalles zwischen zwei flüssigen metallischen Phasen), G. Tammann and P. Schafmeister. Zeit. für anorganische u. allgemeine Chemie, vol. 138, no. 2, Aug. 19, 1924, pp. 219-232, 6 figs. Partition coefficients determined by Wright are reviewed and some new determinations described.

Passivity. Effect of Anions on the Capacity for Passivity of Metals (Ueber den Einfluss der Anionen auf die Passivierbarkeit der Metalle), V. Rothmund. Zeit. für Physikalische Chemie, vol. 109, June 25, 1924, pp. 384-393, 3 figs. Determines passivity of nickel and tin in acid solutions of various concentrations; tin becomes passive in sulphuric acid, hydrochloric acid, etc., but not in nitric acid, etc.

Passivity of Metals, Especially of Iron (Ueber die Passivität der Metalle, Speziell des Eisens), W. J. M. Leverkusen. Zeit. für Elektrochemie u. Angewandte Physikalische Chemie, vol. 30, no. 9, Sept. 1924, pp. 401-416, 4 figs. Definition of passivity; theories to explain phenomenon; passivity curve; effect of size of surface on time taken in becoming passive; passivity with currents of various strength; iron being made passive as an anode in nitric acid.

Photomicrography of. High-Power Photo-Micrography of Metals, F. Rogers. Metal Industry (Lond.), vol. 24, no. 14, Apr. 4, 1924, pp. 328-330, 9 figs. Particulars of super-microscope system.

Plastic Deformation. The Effect of Free Surfaces on the Plastic Deformation of Certain Metals, F. C. Thompson and W. E. W. Millington. Iron & Steel Inst.—Advance Paper no. 9, for meeting Sept. 1924, 14 pp., 3 figs. partly on supp. plate. Gives reasons for believing that at free surfaces deformation will differ distinctly from that within mass; and shows importance of this in connection with determination of elastic limit and with elastic failure.

Plasticity. See Diffusion.

Precious, Canada. Precious Metals in Canada, A. W. G. Wilson. Can. Min. Jl., vol. 45, nos. 20 and 21, May 16 and 23, 1924, pp. 471-474 and 495-498, 7 figs. Historical data; physiography; gold and silver production; rare metals; etc.

Precipitates. 'Structure of Fibre of Electrolytic Metal Precipitates (Über die Faserstruktur elektrolytischer Metallniederschläge), R. Glocker and E. Kaupp. Zeit. für Physik, vol. 24, no. 2, May 22, 1924, pp. 121-139, 15 figs. Discusses ray examination of structure in sheet metal produced electrolytically for determining crystaline arrangement in copper, silver, nickel, chromium and iron.

Precipitation. Precipitation of Aqueous Solutions of Metallic Salts by Calcium Carbonate and Calcium Hydroxide (Die Fällung wässeriger Metallsalzlösungen mit Calciumcarbonat und Calciumhydroxyd), W. Schopper. Metal u. Erz, vol. 21, no. 2, 2nd Jan. issue, 1924, pp. 17-22, 1 fig. Gives numerous examples of different methods of separating iron, copper, nickel, zinc, and arsenic from each other in mixed solutions by means of calcium carbonate and calcium hydroxide; precipitation of iron from chloride solutions generally results in purer hydroxide than from sulphate solutions; in some cases it is preferable to remove copper by cementation, then to precipitate iron and arsenic together by treatment with limestone and current of air.

Properties at High Temperatures. The Physical Properties of Metals at Elevated Temperatures, V. T. Malcolm. Am. Soc. Steel Treating—Trans., vol. 5, no. 3, Mar. 1924, pp. 256-273 and (discussion) 273-275, 12 figs. Investigation undertaken with view of showing characteristic physical properties of materials used in construction of valves, as disclosed by results of tensile tests conducted at series of elevated temperatures; results may be expected to serve as criterion of physical properties available in several materials when used in valves under conditions of superheat, and also relative values for such use.

Properties, Synthetic Bodies. Strength and Density of Synthetic Metal Bodies and Adhesive Force Between Metal Surfaces (Ueber Festigkeit und Dichte Synthetischer Metallkörper und die Adhäsionskräfte zwischen Metallischen Oberflächen), E. Jaenichen. Zeit. für Elektrochemie, vol. 30, no. 4, Apr. 1924, pp. 175-180, 6 figs. Examines strength, density and elasticity of synthetic metal bodies of copper and iron.

Protection. Metal Protection (Metallschutz), E. Maass. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 34, Aug. 23, 1924, pp. 880-883. Theories on corrosion of metals; corrosion of aluminum; processes for protecting metals; corrosion of condenser tubes.

Protective Coating of. New Metal Coats (Neuere Metallüberzüge). Zeit. für Metallkunde, vol. 16, no. 5, May 1924, pp. 175-179. Discusses Liebreich process of electrolytic coating with chromium to prevent corrosion, and Schulze electrolytic coating process of aluminum for protection against weather conditions or chemicals.

Powders, Pyrophoric Properties of. Pyrophoric Properties of Metal Powders (Ueber die Pyrophorität von Metallpulvern), G. Tammann and N. Nikitin. Zeit. für anorganische u. allgemeine Chemie, vol. 135, no. 3, May 21, 1924, pp. 201-204, 1 fig. Iron produced by reduction of ferrous oxalate in hydrogen at 530 deg. or below, without stirring, is pyrophoric; when temperature is 536 deg. or over, metal is non-pyrophoric; if salt is stirred during reduction a non-pyrophoric metal can be obtained at 370 deg., temperature at which reduction commences; temperature at which each metal loses its pyrophoric properties is same as that at which cold-drawn metal regains its original properties.

Radiation Measurement. Micropyrometer With Spectral Decomposition and Optically Observed Melting Points of Some Platinum Metals (Ueber ein Mikropyrometer mit spektraler Zerlegung und die optisch beobachteten Schmelzpunkte einiger Platinmetalle), F. Henning and W. Heuse. Zeit. für Physik, vol. 29, no. 3-4, 1924, pp. 157-174, 1 fig. Discusses radiation properties of metals and describes micropyrometer and process of calibration; particulars of observations made.

Rare, Analysis of. Analytical Methods for Certain Metals, Including Cerium, Thorium, Molybdenum, Tungsten, Radium, Uranium, Vanadium,

Titanium, and Zirconium, R. B. Moore, S. C. Lind, J. W. Marden, J. P. Bonardi, C. W. Daviw and J. E. Couley. U. S. Bur. Mines—Bul. 212, 1923, 320 pp., 6 figs., partly on supp. plate. Gives bibliography.

Recovery from Jewelers' Waste. Methods for the Recovery of Platinum, Iridium, Palladium, Gold, and Silver From Jewelers' Waste, C. W. Davis. U. S. Bur. Mines—Technical Paper no. 342, 1924, 14 pp. Describes necessary manipulations and chemical procedures for recovery of valuable metals from scrap, filings, sweeps, and other waste.

Recrystallization. Recrystallization and Grain Growth in Soft Metals, M. Cook and U. R. Evans. Am. Inst. Min. & Met. Engrs.—Trans., no. 1382-E, Nov. 1924, 24 pp., 14 figs. Describes procedure for obtaining specimens of lead, tin, and cadmium with moderately equiaxed structure and smooth surface suitable for etching without grinding and polishing; advantages of general oblique illumination (as opposed to vertical illumination) in photomicrography of pure metals; statistical study of changes brought about in deformed lead, on annealing.

Single-Crystal. Method of Producing Single Crystal Metals (Eine Methode zur Herstellung einkristalliger Metalle), I. Obreimow and L. Schubnikow. Zeit. für Physik, vol. 25, no. 1, June 24, 1924, pp. 31-36, 3 figs. Describes modification of Tamman method by means of which single crystals of tin, cadmium, zinc, antimony, aluminum, magnesium, and copper may be produced.

Solution in Mercury. Heats of Solution of Some Metals in Mercury and in Gold Amalgam and Heat of Mixibility of Some Amalgams (Die Lösungswärmen einiger Metalle in Quecksilber und in Goldamalgam, sowie die Mischungswärmen einiger Amalgame), G. Tammann and E. Ohler. Zeit. für anorganische u. allgemeine Chemie, vol. 135, nos. 1 and 2, May 8, 1924, pp. 118-126. Discusses determination of heats of solution, heats of mixibility of Mg-amalgams with Zn-amalgams, etc.

Specific Heats. An Improved Method of Measuring the Specific Heats of Metals at High Temperatures, K. K. Smith and L. I. Bockstahler. Nat. Acad. Sciences—Proc., vol. 10, no. 9, Sept. 1924, pp. 386-388. Determination of specific heat of tungsten at temperatures between 2375 deg. K. and 2475 deg. K.

New Method for Determining the Specific Heat of Metals (Eine neue Methode zur Bestimmung der spezifischen Wärme von Metallen), W. U. Behrens and C. Drucker. Zeit. für Physikalische Chemie, vol. 113, no. 1-2, 1924, pp. 79-110, 9 figs. Details of new method in which a thin metal wire is heated in vacuum to constant temperature, electric energy is passed through and temperature rise is determined by measuring resistance before and after heating.

The Specific Heats of Magnesium, Calcium, Zinc, Aluminum and Silver at High Temperatures, E. D. Eastman, A. M. Williams and T. F. Young. Am. Chem. Soc.—Jl., vol. 46, no. 5, May 1924, pp. 1178-1183. Description of measurements and record of results.

Spinning. The Spinning of Metals, Wm. Mason. Metal Industry (Lond.), vol. 25, no. 20, Nov. 14, 1924, pp. 469-470, 11 figs. Principle of spinning; spinning "undersunk" articles; spinning lathe and tools; spinning qualities of various metals and their annealing.

Spraying. See METAL SPRAYING.

Strain Detection. The Detection of Strain in Metals, J. D. Jevons. Metal Industry (Lond.), vol. 24, no. 10, Mar. 7, 1924, p. 225. Survey of work done by various investigators on this subject, together with comments on practical utility of the different methods suggested.

Strength. Cross-Relations of Strengths of Metals in Tension, Compression, Torsion and Transverse Loading, G. B. Upton. Sibley Jl. of Eng., vol. 38, no. 1, Jan. 1924, pp. 2-6, 2 figs. Underlying relationships of strengths of materials under various kinds of loading; proper criteria of failure to apply to different kinds of metal in different places; reasons why specification of tension properties of a metal has been and will continue to be so satisfactory in insuring properties desired, whatever the kind of loading applied in actual structure.

Sulphurizing and Desulphurizing of. Sulphurising and Desulphurising of Metals by Basic Slags and Fluxes, B. Bogitch. Metal Industry (Lond.), vol. 24, no. 21, May 23, 1924, pp. 498-499. Describes methods and results of experiments. Translated from French, and contributed at symposium arranged by Faraday Soc., Inst. Metals, Inst. British Foundrymen, and Non-Ferrous Research Assn.

Surfaces, Properties of. The Properties of Metallic Surfaces, J. B. Nevitt. Birmingham Met. Soc.—Jl., vol. 8, no. 10, pp. 425-440 and (discussion) 441-446. Reviews means by which variations in surface conditions may be produced, and outlines effect of these surface conditions upon properties of metal.

Synthetic. See Compressing Powdered.

Temperature, Effect on. Effect of Temperature on the Properties of Metals, F. C. Thompson. Metal Industry (Lond.), vol. 25, no. 26, Dec. 26, 1924, pp. 609-611. Recuperation temperature; influence of allotropic changes and their importance in case of zinc; temperature influence of 70/30 brass, and practical application; temperature phenomena with steels; effect of alloying elements in steel; etc. (Abstract.) Paper read at Manchester Met. Soc.

Effect of Temperature upon Metals, E. G. Jarvis. Metal Industry (N. Y.), vol. 22, no. 11, Nov. 1924, pp. 446-447. Table giving data on tensile strength and elastic limit, and torsional strength and elastic limit at various temperatures.

Summary of the Results obtained from Experiments made during the Years 1918 to 1923 of the Effects of Temperature on the Properties of Metals, A. Mallock. Roy. Soc.—Proc., vol. 105, no. A730, Feb. 1, 1924, pp. 129-134, 6 figs. Study of effects which variations of temperature produce on elasticity and other constants of various metals.

Tensile Strength. The Relationship Between Tensile Strength, Temperature, and Cold-Work in Some Pure Metals and Single Solid Solutions, D. H. Ingall. Inst. of Metals—Advance Paper no. 8, for meeting Sept. 8-11, 1924, 24 pp., 7 figs. Results of investigation on silver, aluminum, nickel, 70:30 brass, and 80:20 cupro-nickel.

Tension Testing. Tension Testing of Thin Plate Metals, N. S. Otey. Iron Age, vol. 113, no. 14, Apr. 3, 1924, pp. 1008-1009, 5 figs. New test grips claimed to insure accurate results on duralumin and alloy-steel sheets.

Testing. Bending Tests with Rotating Bars (Essais de flexion avec rotation du barreau pour de fortes valeurs de la flèche de flexion), M. Cretin and M. Seigle. Revue de Métallurgie, vol. 21, no. 6, June 1924, pp. 358-367, 24 figs. Discusses principle of fatigue test by rotary bending; bending tests beyond elastic deformation.

Importance of Elastic Limit, Elongation and Notched-Bar Test for Constructors (Ueber die Bedeutung der Elastizitätsgrenze, Bruchdehnung und Kerbzähigkeit für den Konstrukteur), P. Ludwik. Zeit. für Metallkunde, vol. 16, no. 6, June 1924, pp. 207-212. Discusses value of usual tensile-strength testing methods, emphasizes insufficiency of tensile test, uncertainty of measuring

limit of elasticity, and suitability of combining tensile strength with notched-bar test.

Significance of Limit of Elasticity, Elongation and Notched Bar Tests to the Constructor (Die Bedeutung der Elastizitätsgrenze, Bruchdehnung und Kerbzähigkeit für den Konstrukteur), P. Ludwik. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1093-1094. Discusses uncertainty in measuring elasticity, flow limit in place of tensile strength, elongation and construction, ductibility and fatigue, brittleness of ductile metals under certain conditions, etc.

Some Aspects of the Mechanical Testing of Materials, R. T. Rolfe. Birmingham Met. Soc.—Jl., vol. 8, no. 9, Feb. 1924, pp. 385-405 and (discussion) 405-411, 7 figs partly on supp. plate. Results of investigation carried out on eyebolts; considerations of Izod test in its relation to question of brittleness in mild steel; slag inclusions in forgings and their relation to hardening cracks and failures occurring in service; work-hardening of forgings in service.

Theory of. Theory of Metals (Beitrag zur Theorie der Metalle), J. Frenkel. Zeit. für Physik, vol. 29, no. 3-4, 1924, pp. 214-240. Movement of valency electrons and electric conductivity of metals; forces of cohesion and compressibility of metals, etc., leading to explanation of crystal structure of most metals.

Thermal Conductivity. See HEAT TRANSMISSION, Thermal-Conductivity Values.

Thermal Emissive Power. The Relation Between the Total Thermal Emissive Power of a Metal and Its Electrical Resistivity, C. Davisson and J. R. Weeks, Jr. Optical Soc. of Am.—Jl., vol. 8, no. 5, May 1924, pp. 581-605, 6 figs. Theoretical considerations. Details of experiments, and results obtained. Bibliography.

Uses. New Uses for Metals. Metal Industry (N. Y.), vol. 22, nos. 1 and 2, Jan. and Feb. 1924, pp. 1-4 and 55, 3 figs. Symposium containing following articles: Researching the Field of Brass and Copper Consumption, W. A. Willis; Development of Zinc, S. S. Tuthill; New Uses of Lead and Tin, G. O. Hiers; Aluminum; New Uses and Applications of Nickel and Its Products, E. A. Turner and R. L. Suhl; Miscellaneous Metals, A. Bregman.

The First Use of Metals, T. A. Rickard. Eng. & Min. Jl.-Press, vol. 117, nos. 13, 15, and 19, Mar. 29, Apr. 12, and May 10, 1924, pp. 528-530, 602-604 and 759-762. Early mining and metallurgical practice and uses of metals. Mar. 29: Gold and silver. Apr. 12: Copper and bronze. May 10: Iron, lead, and zinc.

Vapors, Condensation Temperature. See VAPORS, Metal.

Volumetric Analysis. New Methods of Volumetric Analysis (Ueber neue Methoden der Massanalyse), K. Jellinek and W. Kühn. Zeit. für anorganische u. allgemeine Chemie, vol. 138, no. 1, Aug. 4, 1924, pp. 81-103 and 109-134. Part VI: Gives suitable indicators for acidimetric and alkalimetric titration. Part VII: Precipitation of metals as ferrocyanide; determination of zinc; volumetric analysis by hydrolytic precipitation; titration of weakly dissociated salts.

New Methods of Volumetric Analysis (Ueber neue Methoden der Massanalyse), K. Jellinek and W. Kresteff. Zeit. für anorganische u. allgemeine Chemie, vol. 137, no. 3-4, July 21, 1924, pp. 333-348. Chlorometry as substitute for iodimetry and other analytical methods.

Wear Resistance. A Universal and Practical Machine for Determining the Resistance of Metals to Wear under the Various Kinds of Friction Encountered in Practice, F. P. Hitchcock. Testing, vol. 1, no. 2, Feb. 1924, pp. 147-155, 5 figs. Describes machine which is also suitable for investigation of efficiency of anti-friction metals and of lubricants.

The Jannin Method for Testing Metals as to Wear, and Its Application to Testing Antifriction Metals (Etude de la méthode de M. L. Jannin pour l'essai des métaux à l'usure et de son application à l'essai des métaux antifrictions), M. P. Nicolau. Revue de Métallurgie, vol. 21, no. 6, June 1924, pp. 347-355, 1 fig. Shows that by this method resistance to wear of anti-friction metals cannot be determined, and that application of this method is limited to rapid determination of friction conditions.

White. See LEAD ALLOYS, White Metals.

Work Hardening. See HARDNESS, Work Hardening.

Work Hardness, Effect of Temperature on. Effect of Temperature on Work Hardening Metal, E. G. Herbert. Can. Machy., vol. 32, no. 8, Aug. 21, 1924, pp. 19-21, 12 figs. Experiments prove heat essential in some stamping operations, and that cutting tools increase durability at speeds which raise work to its critical temperature.

X-Ray Examination. X-Ray Examination of Metals at the Watertown Arsenal, Watertown, Mass., T. C. Dickson. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, p. 773. Operation of 280,000-volt X-ray equipment and results obtained.

METEOROLOGY

Atmospheric Disturbances. See RADIOTELEGRAPHY, Atmospherics.

Wind. See WIND.

METHANOL

Action on Metals. See METALS, Acetone and Methanol, Action of.

Properties, Manufacture, and Uses. Methanol: Its Properties, Manufacture and Uses, R. F. Remler. Chem. Age (N. Y.), vol. 32, nos. 3 and 4, Mar. and Apr. 1924, pp. 109-111 and 159-161, 3 figs.

METHYL CHLORIDE. See REFRIGERANTS, Methyl Chloride.

METROCLINE. See GIRDERS, Deflection-Testing Instrument.

MICA

Australia. Australian Mica Deposits. Indus. Australian & Min. Jl., vol. 71, no. 1846, Apr. 24, 1924, p. 616. Valuable industry neglected. Uses for mica.

Austria. Austrian Mica (Der österreichische Nutzglimmer), H. Mohr. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 25/26, June 27, 1924, pp. 234-238, 2 figs. Details of kinds of mica available, their properties and uses, mining industry originating in war, and capable of further development.

Built-up, Manufacture of. The Manufacture of Built-Up Mica, J. R. McClain. Elec. Jl., vol. 21, no. 1, Jan. 1924, pp. 10-16, 5 figs. Method of mining; early application of sheet mica; classes of built-up mica; method of hand and machine building; semi-automatic building; selection of mica splittings and of bonds; general requirements of built-up mica.

Dielectric Properties. The Dielectric Properties of Mica, D. W. Dye and L. Hartshorn. Physical Soc. Lond.—Proc., vol. 37, no. 206, Dec. 15, 1924, pp. 42-55 and (discussion) 55-57, 4 figs. Describes two methods used for determining dielectric constant of thin sheets of mica and discusses errors; results of measurements on over 170 sheets of mica; gives values of power factor for many of the samples.

Insulation. Mica and Micanite Insulation, A.

A. C. Dickson. Elec. Rev., vol. 94, nos. 2416 and 2417, Mar. 14 and 21, 1924, pp. 408-409 and 469-470. Varieties, properties, practical tests and choice of mica, and manufacture and test of commutator micanite.

See also INSULATING MATERIALS, ELECTRIC, Mica.

Production, 1923. Mica in 1923, B. H. Stoddard. U. S. Geol. Survey (Mineral Resources of U. S.), no. II:17, Oct. 8, 1924, pp. 143-148. Production; classification; world's production; imports and exports.

MICANITE. See MICA, Insulation.

MICROMETERS

Care of. Proper Care Essential to Micrometer Accuracy. Can. Machy., vol. 32, no. 4, July 24, 1924, pp. 25-26, 6 figs. Hints on use and care of measuring instruments.

Projection. The Lewbeck Projection Micrometer. Engineering, vol. 117, no. 3048, May 30, 1924, p. 716, 3 figs. Instrument exhibited at Brit. Empire Exhibition for measuring fine wires.

Railway Shops. Application of Micrometers in Railway Shops, M. H. Williams. Ry. Mech. Engr., vol. 98, nos. 8 and 9, Aug. and Sept. 1924, pp. 481-485 and 553-558, 10 figs. Output and quality of work in car shop is improved by their intelligent use. Interchangeability of locomotive repair parts made possible by using accurate measuring devices.

MICROPHONES

Batteries for. The Electric Battery and the Microphone (La pile electrique et le microphone), E. Reynaud-Bonin. Revue Générale de l'Electricité, vol. 15, no. 21, May 24, 1924, pp. 923-926, 1 fig. Discusses selection of battery type suitable for microphone service; analysis of types of battery used more or less successfully for this purpose.

Film. The Siemens Film-Microphone and Siemens Talking Film (Das Siemens-Bandmikrophon und der Siemens-Bandsprecher, E. Gerlach. Siemens-Zeit., vol. 4, no. 6, June 1924, pp. 165-168, 4 figs. Discusses transformation of acoustic into electric work, construction and action of carbon and other microphones, sound amplifiers, development of talking film, etc.

Glow-Discharge. Microphones Without Diaphragms. Wireless Wld., vol. 14, no. 20, Aug. 13, 1924, pp. 559-560, 4 figs. Microphone which has been developed in America by Dr. P. Thomas and known as "glow discharge microphone" operates on principle where diaphragm can be dispensed with; in this instrument electric discharge takes place between two electrodes which are adjusted to very close proximity. "Kathodophon" consists of small perforated metal tube which constitutes anode and heat resisting material which, until it comes near anode, is cylindrical in form. Shows "Kathodophon" installed in broadcasting studio in Germany.

MICROSCOPES

Davon. The Davon Super-Microscope. English Mechanics, vol. 120, no. 3096, July 25, 1924, pp. 16-18, 5 figs. Outlines principal features and gives results of tests.

Design. Microscopes. Eng. Progress, vol. 5, no. 2, Feb. 1924, pp. 27-29, 3 figs. Physical principles of design; manufacturing difficulties; importance of German industry; special microscopes.

Illumination of. Modern Methods of Microscope Illumination. High Power Opaque Illumination, C. Beck. Jl. of Sci. Instruments, vol. 1, no. 8, May 1924, pp. 238-242, 6 figs. Various questions connected with high power opaque illumination are considered; a new immersion ring illuminator and a new vertical illuminator are described.

Modern Methods of Microscope Illumination. High Power Transparent Illumination, C. Beck. Jl. Sci. Instruments, vol. 1, no. 10, July 1924, pp. 314-316. Discusses characteristics of transparent illumination and considers precautions to be taken in order to reduce glare and flooding.

Vertical Illuminator for Microscopes. Engineering, vol. 118, no. 3053, July 4, 1924, p. 30, 3 figs. Describes vertical illuminator recently introduced by R. & J. Beck, Ltd., London, in which reflector can be moved along two lines at right angles and can also be tilted about both these axes. It is thus possible to adjust position and angle of reflector as required.

Metallographic Work. Microscopes for Metallographic Work. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 514-515, 6 figs. Describes high-powered microscope for use in research laboratory, and microphotographic apparatus for use in industrial plants; microphotographs produced with these instruments.

Metallurgical. Ore Problems and the Microscope, W. L. Uglow. Can. Inst. Min. & Metallurgy—Bul., no. 147, July 1924, pp. 495-504. Application of microscope in discovery, development, concentration, and reduction of metallic ores; types of microscopes.

Recent Innovations in the Metallurgical Microscope. Foundry Trade Jl., vol. 29, no. 397, Mar. 27, 1924, pp. 255-258, 13 figs. Principle embodied in super-microscope, and micro-telescope.

The Microscope as an Aid in Metallurgy, F. E. Lee. Can. Inst. Min. & Metallurgy—Bul., no. 147, July 1924, pp. 505-510, 8 figs. Application of microscope in problems arising from various operations of Tadanac Reduction Works.

Portable. Portable Microscope. Iron Age, vol. 113, no. 5, Jan. 31, 1924, p. 371, 4 figs. New type for use on metal in shop; applicable to various shapes.

Reichert-Brinell. An Improved Type of Microscope for Measuring the Impressions Produced in the Ball Hardness (Brinell) Test, O. C. Rudolph. Testing, vol. 1, no. 1, Jan. 1924, pp. 45-48, 2 figs. Details of latest Reichert-Brinell microscope.

MICROSCOPY

Telephone Apparatus, Application to. Photomicrography and Technical Microscopy in its Application to Telephone Apparatus, F. F. Lucas. Bell System Tech. Jl., vol. 3, no. 1, Jan. 1924, pp. 100-145, 51 figs. Discussion of apparatus; compound microscope; polarized light; preparation of specimens; Bell-system photomicrographic laboratory, New York City; ultra microscope; micrometry; dark-ground illumination.

MILK

Dairies. See DAIRIES.

MILLING

Automatic. Automatic Milling, F. D. Jones. Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 919-925, 16 figs. See also Machy. (Lond.), vol. 24, no. 621, Aug. 21, 1924, pp. 653-659, 16 figs. Brown & Sharpe method as applied to various operations selected to show how different classes of work are milled on automatically-controlled machines.

Brakes, Drums and Spiders. Machining Sheldon Brakes, Drums and Spiders, F. H. Colvin. Am. Mach., vol. 60, no. 11, Mar. 13, 1924, pp. 387-389, 9 figs. Special fixtures and tools devised for machining work of odd shape; fixtures are shown

in considerable detail so their construction can be more readily understood.

Grooves. The Milling of Grooves (Das Fräsen von Nuten). Praktischer Maschinen-Konstrukteur, vol. 57, no. 5, Feb. 5, 1924, pp. 39-42, 4 figs. Describes different methods, tools and machines employed, and shows how running time of a Loeve milling machine can be calculated with aid of alignment charts.

MILLING CUTTERS

Cooling. Cooling Cutters in Milling, (Die Kühlung der Werkzeuge beim Fräsen), M. von Brandt. Werkstattstechnik, vol. 18, no. 15, Aug. 1, 1924, pp. 393-394, 3 figs. Discusses inadequate provisions for supplying cooling water to high-speed milling cutters; gives suggestions for effective cooling and states satisfactory results obtained.

Cutting Ratio. Cutting Ratios of Cutter Heads in Milling Aluminum Alloys (Die Ermittlung der günstigsten Schnittverhältnisse von Messerköpfen beim Fräsen von Aluminiumlegierungen), W. Lippart. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 657-659, 5 figs. Discusses most favorable and economic angle of cutters, feeds, power consumption, etc.

Helical Tests. See GEARS, Double Helical.

Manufacture. Milling Cutter Notes, J. Doe. Model Engr., vol. 51, no. 1211, July 10, 1924, pp. 31-35, 7 figs. Shows that good cutters can be made without great effort and how they may be maintained in true-running and sharp condition; general considerations; cutting teeth; hardening and grinding.

MILLING MACHINES

Attachments. Combination Cherrying and Profiling Attachment. Forging — Stamping — Heat Treating, vol. 10, no. 5, May 1924, pp. 180-182, 7 figs. Improvement in form of die-sinking equipment in form of combination cherrying and profiling attachment for use on Becker vertical milling machines.

Special Milling Attachments and Fixtures, F. D. Jones. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 279-283, 14 figs. Examples of milling on standard machines by utilizing attachments or fixtures designed for unusual milling operations.

Cutters for. See MILLING CUTTERS.

Double-Spindle. A Double-Spindle Production Milling Machine. Am. Mach., vol. 60, no. 19, May 8, 1924, pp. 701-703, 3 figs. Sundstrand machine developed by Rockford Milling Machine Co.; work held on special turret.

Duplex Head. Duplex Head Milling Machine. Machy. (Lond.), vol. 23, no. 591, Jan. 24, 1924, pp. 554-555, 2 figs. Developed to meet requirements of manufacturers for either slab or face-milling operations.

Electric Drive. Milling Machines With Electric Drive for Cutting and Feeding (Fräsmaschine mit elektrischem Schnitt- und Vorschubantrieb), M. Heym. Praktische Maschinen-Konstrukteur, vol. 57, no. 19-20, June 4, 1924, pp. 275-278, 8 figs. Shows that by electric control the cutting and feeding motions can be adjusted much more completely to working conditions.

Feed Drive. Choice of Feed Drive in Milling Machines (Wahl des Vorschubantriebes bei Fräsmaschinen), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, no. 23, June 24, 1924, pp. 327-331, 14 figs. Shows by three different examples that independent drive of feed table is best solution, and that drive from cutter shaft must be eliminated.

Fixtures. Fixtures for Production Milling, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 521-523, 5 figs. Examples of fixture design are given in detail to illustrate modern trend in locating and clamping methods and in general features of construction.

How Milling Machine Service Has Helped Manufacturers, F. H. Colvin. Am. Mach., vol. 61, no. 11, Sept. 11, 1924, pp. 405-409, 12 figs. Shows how high-production milling can be secured on standard machines by use of well-designed fixtures.

See also Attachments.

Specialized Work. Wide Range of Specialized Work Now Performed by Milling Machines, W. L. Carver. Automotive Industries, vol. 51, no. 8, Aug. 21, 1924, pp. 356-360, 10 figs. Standard machines with special heads do great variety of work at small additional expense, and place this type of tool in semi-automatic class.

Standards. Formulation of a Manufacturing Plan for Horizontal Milling Machines (Aufstellung eines Fabrikationsplanes für Wagerecht-fräsmaschinen), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, nos. 31 and 43, Aug. 19 and Nov. 11, 1924, pp. 435-440 and 581-584, 37 figs. Discusses variety of feeds, speeds, supports, frames, etc. offered in trade catalogues, and shows how more uniformity might be introduced.

Toolholders. The Standardization of Tool Fixtures for Milling Machines (Die Normung der Werkzeugbefestigung an Fräsmaschinen), G. Schlesinger and K. Hegner. Werkstattstechnik, vol. 18, no. 1, Jan. 1, 1924, pp. 1-3, 9 figs. Recommendations for standardization of toolholders by standards committee of Assn. German Machine-Tool Builders.

Types. Milling Machines, Their Operation and Forms (Arbeitsweise und Formgebung der Fräser), E. Toussaint. Praktische Maschinen-Konstrukteur, vol. 57, nos. 39 and 50, Oct. 14 and Dec. 30, 1924, pp. 533-535 and 675-677, 15 figs. Discusses proper shapes for milling cutters and describes principal types of milling machines, showing work of standardization.

MINE CARS

[See also MINES, Haulage.]

Larry, Motors for. Specially Designed Motors for Larry-Car Service, C. A. Atwell. Coal Age, vol. 25, no. 7, Feb. 14, 1924, pp. 237-238, 5 figs. Mechanical details are such as to accommodate heavier axles; must have armature winding and gear ratio suitable for slow speed; motors fitted with ball bearings.

Lubrication. A Standardized Greasing System for Mine Cars. Coal Mine Mgmt., vol. 3, no. 9, Sept. 1924, pp. 52-54 and 56, 5 figs. Describes a greasing system placed on market that is made up of three units, comprising (1) one standard type of grease plug for all cars (and that replaces present oilers or plugs on any type or make of car no matter where located), (2) a detachable coupler nozzle for applying lubricant that makes an instant, positive, and leakproof connection with oiler, and (3) an automatic air-operated greasing machine.

32-cu. ft.-Capacity. A New Design for Underground Ore Cars, L. L. Quigley. Eng. & Min. Jl.-Press, vol. 118, no. 2, July 12, 1924, pp. 57-58, 6 figs. Describes new car of Elm Orlu Min. Co., Butte, Mont., which meets all existing mine clearances, loading, dumping and track conditions and is very efficient in ore handling from stopes to shaft pockets; 33 in. wide by 30 in. high by 54 in. in length, capacity 32 cu. ft.

MINE HAULAGE

Accidents. The Nunnery Colliery Accident, Thos. H. Mottram. Colliery Guardian, vol. 128, no. 3328, Oct. 10, 1924, pp. 936-937, 1 fig. Report on causes of and circumstances attending

underground haulage accident which occurred on Dec. 3, 1923; conclusions and recommendations.

Analysis of Problems. The Analysis of Mine Haulage Problems, E. B. Stavely. Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 155-160, 7 figs. Basic principles relating to electric haulage and brief comments upon application of these principles in analysis of mine-haulage problems.

Coal Mines. Designing Conveying Plants for Coal Mines (Richtlinien für den Entwurf der Tagesförderanlagen von Steinkohlenbergwerken), K. Hölzer. Glückauf, vol. 60, no. 44, Nov. 1, 1924, pp. 1003-1009, 9 figs. Discusses shaft arrangements and car circulation above ground, and design and construction of various types of headgears.

Hoisting from Great Depths (L'extraction aux grandes profondeurs), L. Lahoussay. Revue de l'Industrie Minérale, no. 95, Dec. 1, 1924, pp. 539-550, 6 figs. Work of sub-committee on winding engines, cable covering and cable construction, winding equipment, useful load and tonnage per hour.

Recent Progress in Mine Haulage, Rob. M. Black. Coal Industry, vol. 7, no. 1, Jan. 1924, pp. 37-38. Developments during past year from technical and safety standpoint; new storage-battery locomotives added to list of permissible equipment.

Some Notes on Underground Transport, A. V. Reis. Min. Inst. Scotland—Trans., vol. 44, part 6, 1923-1924, pp. 170-178. See also Instn. Min. Engrs.—Trans., vol. 67, part 1, Mar. 1924, pp. 14-22. Analysis of costs of hauling coal in mines, and discussion of the different cost items.

See also COAL HANDLING, Conveyors.

Development, Arizona. Development of Mine Transportation in Clifton-Morenci District, N. Carmichael and J. Kiddie. Am. Inst. Min. & Met. Engrs.—Trans., no. 1310-M, Mar. 1924, 28 pp., 15 figs. Describes evolution of transportation at important mining property, beginning at time when railhead was 400 mi. distant, and tracing steps leading to development of what is probably heaviest ore train ever operated in underground mine service over narrow-gage tracks, 300-ton ore train on 20-in. track, at working costs closely approximately those obtained on systems involving much greater capital expenditure.

Electric. Efficiency of Electric Haulage in Mines, C. A. Harmon. Modern Min., vol. 1, no. 3, Oct. 1924, pp. 66-69, 3 figs. Compares an ideal haulage system to one that is typical of a great many mines.

Equipment. Haulage Equipment for Mines. Engineering, vol. 118, no. 3074, Nov. 28, 1924, pp. 732-733, 3 figs. Describes 20-hp. hauling or winding engine working with compressed air or steam; stretcher-bar haulage engine; and 15/20-hp. electric haulage gear or hoist; manufactured by Holman Bros., Cornwall, Eng.

Rope Breakage. See COAL MINES, Haulage-Rope Breakage.

Winding, Deep-Level. Notes on Deep-Level Winding, J. A. Vaughan. So. African Eng., vol. 35, nos. 7, 8, 9 and 10, July, Aug. Sept., and Oct. 1924, pp. 134-138, 155-158, 176-177, and 198, 3 figs. See also So. African Instn. Engrs.—Jl., vol. 23, no. 3, Oct. 1924, pp. 252-285, 18 figs. Deals with goldfields of Witwatersrand. Discusses shafts, skips and cages, winding engines, drums, clutches, brakes, winding ropes, tail-ropes, underground engine rooms, etc.

MINE HOISTING

Cycles Calculation. Notes on Mine Hoisting, F. L. Stone and F. R. Grant. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 618-621, 6 figs. Results that have been obtained from actual installations which have been designed to meet cycles calculated in manner described.

MINE LOCOMOTIVES

[See also MINES, Haulage.]

Ball Bearings on. See BEARINGS, BALL, Mine-Locomotive Motors.

Benzol. Experience and Results with Benzol Driven Locomotives (Erfahrungen und Ergebnisse aus dem Benzollokomotivbetriebe), H. Giese. Glückauf, vol. 60, no. 23, June 7, 1924, pp. 463-468, 5 figs. Discusses construction and operation of new type 4-cylinder locomotive by Rheiner Maschinenfabrik Windhoff. Efficiency trials in comparison with one-cylinder locomotive, showing 14 per cent greater speed and 25 per cent less fuel consumption.

Compressed-Air. See COMPRESSED AIR, Coal Mines.

Compressed-Air, Compressor for. See AIR COMPRESSORS, Five-Stage.

Control. Latest Improvements in Locomotive, H. H. Johnson. Coal Age, vol. 26, no. 11, Sept. 11, 1924, pp. 367-370, 7 figs. Developments of new controllers due to use of larger currents and necessity for power economy; electromagnetic and electropneumatic contractors on large locomotives; field control provided for storage-battery motors.

Electric. Baldwin-Westinghouse Locomotive for Mining Service, R. M. Campbell. Baldwin Locomotives, vol. 3, no. 1, July 1924, pp. 62-71, 23 figs. Development, construction, equipment, and accessories.

Important Points in the Construction of Electric Mining Locomotives, N. H. Reiger. Coal Mine Mgmt., vol. 3, nos. 3 and 5, Mar. and May 1924, pp. 48-51 and 61, and 33-37, 7 figs. Frame construction; motor capacity and construction; control equipment; types of control; standardization of motor equipment.

The New Ore Train Locomotives of the Swedish State Railways (Riksgränsbanans nya malmtågslokomotiv), S. Halden-Teknisk Tidskrift, vol. 54, no. 23, June 7, 1924, pp. 104-109 (Electroteknik), 10 figs. Description of design and equipment of new Swedish locomotives, performance diagrams and very complete technical data and photographs.

See also Storage-Battery.

Gasoline. Petrol Motor Locomotives for Mines. Eng. Progress, vol. 5, no. 1, Jan. 1924, pp. 8-11, 6 figs. Notes on weight, tractive effort, gradients, rails; fuels employed; arrangement of engine; drive of axles; speed regulation; safety devices for mine locomotives; locomotive raising device; danger of fire damp; water cooling; etc.

Slow-Speed. Slow Speed Locomotives for Coal Mines, S. W. Farnham. West. Soc. Engrs.—Jl., vol. 29, no. 9, Sept. 1924, pp. 363-369 and (discussion) 369-370. Development of special locomotive for gathering; advantages of slow speed.

Storage-Battery. Approval System of the Bureau of Mines as Applied to Permissible Storage-Battery Locomotives, L. C. Ilsley and H. B. Brunot. U. S. Bur. Mines—Reports of Investigations, no. 2581, Mar. 1924, 11 pp. Detailed information covering inspection and test for safety of a storage-battery locomotive manufactured by Mancha Storage Battery Co., St. Louis, Mo.

Notes on the Use of Storage-Battery Locomotives and Storage-Batteries Underground, J. Shanks. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 654-666, 12 figs. Author gives his experience in operating different types or designs of locomotives, and draws attention to drawbacks of some designs, and to improvements made in more recent storage-battery locomotives.

put on market, as regards efficiency, upkeep, and safety.

On the Storage Battery Locomotives for Mines, T. Kurayama. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 432, July 1924, pp. 619-623, 1 fig. Actual test data of locomotives in Muke colliery, one of largest in Japan. (In Japanese.)

MINE-RESCUE APPARATUS

[See also BREATHING APPARATUS.]

Automatic, Nitrogen Accumulation in. Danger of Nitrogen Accumulation in Automatic Rescue Apparatus (Die Gefahr der Stickstoffanhäufung in lungenautomatischen Atmungsgeräten), R. Sauer. Glückauf, vol. 60, no. 28, July 12, 1924, pp. 590-593. Describes washing process which eliminates danger from nitrogen and enables very simple construction of apparatus.

British Research Committee Report. Mine Rescue Apparatus. Iron & Coal Trades Rev., vol. 108, nos. 2923 and 2924, Mar. 7 and 14, 1924, pp. 381 and 430-431, 1 fig. See also Colliery Guardian, vol. 127, no. 3298, Mar. 14, 1924, pp. 676, 1 fig. Third report of Research Committee. Use of liquid air and liquid oxygen; description of Aerophor apparatus; construction of vacuum storage vessels for liquid air; etc.

Mine Rescue Apparatus Research Committee—Third and Final Report. Dept. Sci. & Indus. Research (Lond.),—Advisory Council, 1924, 30 pp., 21 figs. Deals mainly with use of liquid air and liquid oxygen in mine-rescue apparatus; details of improved aerophor apparatus.

Carbogen Reviver. The Edina Carbogen Reviver, D. Davidson. Colliery Guardian, vol. 128, no. 3336, Dec. 5, 1924, p. 1440. Describes apparatus designed by Prof. Briggs as result of experiments carried out at Heriot-Watt College Mine Rescue Station.

Inhabad. Mine-Rescue Apparatus (Der Gastaucher Inhabad), H. Woltersdorf. Glückauf, vol. 60, no. 12, Mar. 22, 1924, pp. 211-216, 3 figs. Describes Inhabad apparatus which is respirator with automatic oxygen supply for two hours' working period; all necessary parts for breathing regulation, air purification, and refilling are carried in a box on back, and mask is worn in front.

Liquid-Air. A New Liquid-Air Apparatus, F. P. Mills. Iron & Coal Trades Rev., vol. 108, no. 2923, Mar. 7, 1924, pp. 386-388 (includes discussion), 5 figs. Evolution of liquid-air type of breathing apparatus, including manufacture and properties of the liquid. Describes improved Brown and Mills type of Blackett's Aerophor apparatus; experiments.

Proto. The "Proto" Mine-Rescue Apparatus. Engineering, vol. 117, no. 3051, June 20, 1924, pp. 807-808, 7 figs. Description of breathing apparatus for recovery and rescue work in mines after fires and explosions, manufactured by Siebe, Gorman & Co., Ltd., Lond., exhibited at British Empire Exhibition.

Self-Rescuer. The Carbon Monoxide Self-Rescuer, A. C. Fieldner, S. H. Katz and D. A. Reynolds. Chem. Eng. & Min. Rev., vol. 16, no. 190, July 5, 1924, pp. 389-391, 3 figs. Carbon monoxide self-rescuers are pocket-size gas respirators which protect wearer from air contaminated with poisonous carbon monoxide gas; purpose is to help miners to escape from mines in which fires are burning or explosions have occurred; gives design, construction and materials of self-rescuer.

Types. Miners' Rescue (Algo sobre salvamento minero), L. Torón. Revista Minera Metalúrgica y de Ingenieria, vol. 75, nos. 2934, 2935, 2936, and 2937, July 1, 8, 16, and 24, 1924, pp. 381-384, 400-402, 414-417, and 431-437, 10 figs. Discusses rescuing of miners and rehabilitation of mines, organization of rescue brigades, construction and operation of modern types of rescue apparatus, including Draeger, Tissot, Proto, Brigge, Gibbe, Paul, Aerophor, Brown, and Mills.

MINE-RESCUE WORK

Germany. Rescue Work and First Aid in Prussian Mines in 1922 (Rettungswesen und Erste Hilfe im preussischen Bergbau im Jahre 1922). Zeit. für das Berg-, Hütten- u. Salinenwesen, vol. 72, no. 1, 1924, pp. 39-94, 5 figs. Discusses rescue organization and apparatus, apparatus for protection against gas, experiences and regulations for rescue work, first aid organization, etc.

Practice. First Aid in Mining Practice, T. L. Llewellyn. Colliery Eng., vol. 1, no. 7, Sept. 1924, pp. 338-341. Surveys accident problem in collieries.

Transport of Injured. Some Practical Notes on Mining Ambulance, and the Carbogen Method of Treating Carbon Monoxide Poisoning, D. Davidson. Colliery Guardian, vol. 127, no. 3299, Mar. 21, 1924, pp. 731-733, 9 figs. Describes three types of stretcher for transport of injured; underground ambulance rooms; resuscitation from CO poisoning.

United States. Mine Rescue Work, A. U. Miller. Coal Mine Mgmt., vol. 3, no. 8, Aug. 1924, pp. 38-41. U. S. Bur. Mines carries on investigative work relative to mining industry; history of breathing apparatus; fundamentals of rescue work; apparatus for gas analysis and prevention better than rescue. Abstract of paper read before Coal Mine Safety Conference.

MINE SHAFTS

Cables, Suspending. Suspending Armored Cables in Mines, W. E. Boyle. Elec. World, vol. 83, no. 2, Jan. 12, 1924, pp. 95-96, 2 figs. Describes methods of installation of shaft cables in mines.

Cementation. See SHAFT SINKING, Cementation.

Linings, Cast-Iron. The Evolution of Cast Iron Shaft Linings, J. Riemer. Colliery Guardian, vol. 127, no. 3304, Apr. 25, 1924, pp. 1058-1060, 21 figs. Translation from Glückauf.

Sinking. See SHAFT SINKING.

Surface Extensions. Surface Shaft Extensions. Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 64-66, 2 figs. Two examples of monolithic shaft walls erected on surface to meet special circumstances.

Widening. Widening a Pit Shaft, W. T. E. Malbon. Iron & Coal Trades Rev., vol. 108, no. 2927, Apr. 4, 1924, pp. 547-548, 8 figs. Describes operations and tackle employed in increasing diameter of shaft from 13 ft. to 17 ft.

MINE SIGNALING

Electric. The New "Simplex" System of Electric Signaling for Mine Shafts (Le nouveau système de Signalisation électrique "Simplex" pour puits de mines), G. Paques. Annales des Mines de Belgique, vol. 24, no. 4, 1923, pp. 1007-1019, 7 figs. Describes installation of new type of electric signal in coal mines of Carabinier at Pont de Loup, which has given entire satisfaction; advantages of system.

Geophones. Improvement of the Geophone by the Use of Electrical Sound Amplifiers, W. T. Ackley, Jr., and C. M. Ralph. U. S. Bur. Mines—Reports of Investigations, no. 2639, Sept. 1924, 5 pp., 2 figs. on supp. plate. Brief description of adaption of vacuum-tube audio frequency amplifier to a new form of geophone.

T. P. S. Method. Underground Signalling for Mines by the Ground-Conduction or "T. P. S."

Method, J. J. Jakosky. U. S. Bur. Mines—Reports of Investigations, no. 2576, Feb. 1924, 11 pp., 6 figs. on supp. plates. Description of T. P. S. system of underground communication, apparatus used, operation, and results of tests made.

Underground Radio Signals. Factors Retarding Transmission of Radio Signals Underground, J. J. Jakosky and D. H. Zellers. U. S. Bur. Mines—Reports of Investigations, no. 2651, Nov. 1924, 10 pp., 2 figs. Shows limitations of pure radio and influence of earth strata in retarding pure radio signals.

MINE TIMBERING

Europe. Notes on Mine Timbering and Preservatives in Europe, G. S. Rice. Min. Congress Jl., vol. 10, no. 2, Feb. 1924, pp. 98-99, 1 fig. Review of mine timbering conditions in England, France, Belgium and Germany; preservation of timber further advanced in Europe than in United States. From report to Am. Min. Congress.

Preservation. Impregnation of Mine Timber with Zinc Sulphate for Protection against Attack by Fungi, H. D. Bell. Chem., Met. & Min. Soc. S. Africa—Jl., vol. 24, no. 9, Mar. 1924, pp. 206-211 and (discussion) 211-213. Experimental results obtained while investigating with view to arriving at practical works method of impregnating timber with zinc-sulphate solution; reference to two such plants in operation.

Protecting Mine Timbers With Gunite at Butte, E. M. Norris. Compressed Air Mag., vol. 29, no. 6, June 1924, pp. 881-884, 9 figs. Anaconda Copper Min. Co. has found gunite coatings to be efficacious in fireproofing timbers and airproofing rock surfaces.

Some Destructive Features of Mine Timber, R. Z. Virgin. Coal Trade Bul., vol. 50, no. 8, Mar. 17, 1924, pp. 347-350, 5 figs. Main principle to be kept in mind in mine timbering; effects of various destructive agents; enormity of timber consumption; costs and suggestions for preservative treatment.

Treating Mine Timbers With Preservatives, G. M. Hunt. Min. Congress Jl., vol. 10, no. 2, Feb. 1924, pp. 102-105, 3 figs. This practice making progress; mining companies erecting open tank plants and using hot and cold bath method of treatment. Timber preservatives and specifications; relative durability of different species of wood; service records on mine timbers.

Protection from Fire. Protection of Mine Timbering From Fire, H. E. Tufft. Min. Congress Jl., vol. 10, no. 10, Oct. 1924, pp. 481-484, 2 figs. Outlines possibilities for fire prevention and timber preservation through utilization of the several known methods. Pub. by permission U. S. Bur. Mines.

Storage of Timber. Mine Timbering Serious and Costly Problem. Min. Congress Jl., vol. 10, no. 2, Feb. 1924, pp. 99-101, 4 figs. Notes on method of storing mine timbers, timber supply and cost, and sizes of ties recommended for steel rails from 16 to 60 lb. per yard.

Strength. Strength of Mine Timber, R. P. A. Johnson. Eng. & Min. Jl.-Press, vol. 117, no. 6, Feb. 9, 1924, pp. 240-242, 1 fig. Points to be considered in selecting suitable wood for support of openings.

Wood for Preservation. See WOOD PRESERVATION, Mine Timber.

MINERAL DEPOSITS

Belgian Congo. Geologic Map of the Belgian Congo (Carte géologique du Congo Belge), P. Fourmarier. Revue Universelle des Mines, vol. 4, no. 4, Nov. 15, 1924, pp. 182-208, 1 fig. and 1 map on supp. plate. Discusses stratigraphy, tectonics, and mineral deposits. Contains colored map and explanatory text.

Burma. Mineral Developments in Burma, H. H. Johnson. Min. Mag., vol. 30, no. 4, Apr. 1924, pp. 209-212, 3 figs. Details of coal, silver-lead, and copper deposits in Southern Shan States of Burma, which are attracting attention of London mining circles.

Canada. Mines and Mineral Deposits of Canada, R. P. D. Graham. Can. Inst. Min. & Metallurgy—Bul., no. 151, Nov. 1924, pp. 715-830, 2 figs. Outline of geology of Canada. Brief description of the more important ore deposits and mining districts; deals with metalliferous deposits, nonmetallic mineral deposits, coal and hydrocarbon compounds, and structural materials and clay products.

Colloidal Solutions, Effect of. The Role of Colloidal Solutions in the Formation of Mineral Deposits, H. C. Boydell. Instn. Min. & Metallurgy—Bul., no. 243, Dec. 1924, 108 pp., 2 figs. General properties of colloidal solutions; influence of colloidal solutions on some substances, minerals, and structures of common geological occurrence; effects of colloidal solutions in some types of mineral deposits; and discussion of some general mineral deposit problems with reference to influence of colloids on such.

Heavy Minerals. Some Methods for Heavy Mineral Investigations, R. D. Reed. Economic Geology, vol. 19, no. 4, June-July 1924, pp. 320-337, 1 fig. Discusses methods suitable for attack of petrographic problems, including sampling and preparing samples for study, use of electromagnet, microscope, refractive index, etc.

Jamaica, West Indies. Minerals in Jamaica, S. Brunton. Can. Min. Jl., vol. 45, no. 51, Dec. 19, 1924, pp. 1236-1241, 2 figs. Discusses geology, ore occurrences, and economic possibilities.

Sincosite. The Occurrence and Properties of Sincosite, a New Vanadium Mineral from Sincos, Peru, W. T. Schaller. Am. Jl. Sci., vol. 8, no. 48, Dec. 1924, pp. 462-480, 2 figs. Crystallography; physical and optical properties; chemical composition.

South Africa. Notes on Some Base Metal Deposits in the Union, T. G. Trevor. S. African Jl. of Industries, vol. 7, no. 6, June 1924, pp. 376-382. Notes on tin, antimony, arsenic, chromium, cobalt, lead, manganese, molybdenum, nickel, platinum, sulphur, etc.

Some Base Metal Deposits in the Union, T. G. Trevor. So. African Min. & Eng. Jl., vol. 35, no. 1708, June 21, 1924, p. 1145. Discusses cassiterite deposits, nickel, sulphur, arsenic and mercury. Abstract from Jl. of Industries, June 1924.

MINERAL INDUSTRY

Alberta, Canada. The Mineral Industry in Alberta in 1924, J. A. Allan. Can. Min. Jl., vol. 45, no. 3, Jan. 18, 1924, pp. 68-71, 3 figs. Production was represented largely by coal, natural gas, petroleum and bituminous sand; notes on salt and sodium sulphate.

Ontario. Mineral Production of Ontario. Can. Min. Jl., vol. 45, no. 24, June 13, 1924, pp. 581-583, 4 figs. Preliminary report.

Russia. What Soviet Russia Has Done to Mining and What It Now Offers, S. Brooks. Eng. & Min. Jl.-Press, vol. 117, no. 24, June 14, 1924, pp. 956-958, 3 figs. Mineral production reached its depths in 1921, but is being reëstablished; foreign companies should not overlook present opportunities; security a problem.

Siam and Malaya. The Mineral Industry of Siam and Malaya, With Special Reference to the Tin and Tungsten Markets, G. R. Oswald. Metal Industry (Lond.), vol. 24, no. 2, Jan. 11, 1924,

pp. 25-29, 1 fig. Brief outline of what is now being done, and forecast of probable future production: constructive suggestions as to how metal manufacturers and users may render themselves, in a measure, independent of market fluctuations, and ensure their supplies of raw material.

MINERAL OILS

Metals, Catalytic Influence on. Catalytic Influence of Metals upon Mineral Oils (Ueber den katalytischen Einfluss von Metallen auf Mineralöle), H. Stäger. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 3, Mar. 1924, pp. 93-106, 6 figs. Author gives detailed report of his systematic study of problem; he finds that bare copper, brass, tin and zinc accelerate sludging of oil considerably; action depends upon proportion between surface of submerged metal and volume of oil, except in case of aluminum, tin, nickel and iron, with which oxidation at zone of immersion is of importance; lead, copper and zinc are beaten away by generated asphaltogenous acids; data are compiled in curves, tabulations and photomicrographs.

MINERAL RESOURCES

Alaska. The Ruby-Kuskokwim Region, Alaska, J. B. Mertie, Jr., and G. L. Harrington. U. S. Geol. Surv.—Bul. 754, 1924, 126 pp., 17 figs. partly on supp. plates. Geography, geology, and mineral resources; placer gold is only mineral deposit that has been exploited on a commercial scale.

British Columbia. Reconnaissance of Silver Creek, Skagit and Similkameen Rivers, Yale District, B. C., C. E. Cairnes. Can. Dept. Mines, Geol. Survey, no. 2031, summary report, 1924, part A, pp. 46A-80A, 8 figs. partly on supp. plates. General and economic geology.

What British Columbia Offers the Prospector, A. W. Davis. Eng. & Min. Jl.-Press, vol. 117, no. 11, Mar. 15, 1924, pp. 437-349, 7 figs. Describes some of the more important finds in recent years, in northern part of province.

Bulgaria. The Mineral Resources of Bulgaria, D. A. Wray. Min. Mag., vol. 30, no. 2, Feb. 1924, pp. 73-84, 4 figs. Geology; coal, iron, manganese, chromium, copper, lead and zinc, gold, and other deposits.

Canada. Arnprior-Quyon and Maniwaki Areas, Ontario and Quebec, M. E. Wilson. Can. Dept. Mines, Geol. Survey.—Memoir 136, geol. series no. 117, 1924, 152 pp., 41 figs. partly on supp. plates. Location, area and accessibility; physiography; general geology; mineral deposits. Bibliography.

The Mineral Wealth of the Precambrian, C. V. Corless. Can. Inst. Min. & Met.—Bul., no. 146, June 1924, pp. 366-392 and (discussion) 392-400. See also Roy. Soc. Arts—Jl., vol. 72, no. 3743, Aug. 15, 1924, pp. 607-683 and (discussion) 683-687. Evidence both direct and inferential concerning mineral wealth of greatest physical and geological feature of Canada, viz., Precambrian Shield. Area of entire Shield is given as 2,000,000 sq. mi.

Gaspé Peninsula, Canada. The Mineral Deposits of Gaspe, F. J. Alcock. Can. Min. Jl., vol. 45, no. 41, Oct. 10, 1924, pp. 1000-1003, 4 figs. History, geology and structure; zinc and lead, copper, petroleum, chromite and asbestos deposits.

Illinois. Geology and Mineral Resources of the Kings Quadrangle, J. H. Bretz. Ill. State Geol. Surv., Extract C from Bul. no. 43, 1923, pp. 205-304, 37 figs. partly on supp. plates.

India. The Mineral Resources of the Kolhapur State, H. C. Jones. Geol. Surv. of India—Records, vol. 54, part 4, 1923, pp. 416-430, 2 figs. partly on supp. plate. Topography, drainage, and geology; description of mineral deposits, viz., bauxite (chief mineral of economic value in the state, and occurring in fairly large quantities), building materials, copper, gold, gypsum, iron, kaolin, manganese, saltpeter, and slates.

Nova Scotia. Nova Scotia's Mineral Resources. Can. Min. Jl., vol. 45, no. 14, Apr. 4, 1924, pp. 328-331. Report of Natural Resources Intelligence Service, Ottawa, Can.

MINERALS

Adsorption and Flotation Capacity. See FLOTATION, Minerals.

British Columbia. British Columbia's Record for 1923, R. Dunn. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 20-22. Mineral production for 1923; increase of 12.8 per cent in monetary value over that of 1922.

The Western Mineral Belt of British Columbia, V. Dolmage. Can. Min. Jl., vol. 45, no. 26, June 27, 1924, pp. 614-617. Deals with deposits occurring in Batholith Coast Range and along its western contact.

Canadian Production. Canada's Mineral Production in 1923, S. J. Cook. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 5-9. Twelve per cent increase, to $214,102,000.

Deposits. See MINERAL DEPOSITS.

Non-Metallic, Canadian Production. Non-Metallics in 1923, N. B. Davis. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 19-20. Canadian production.

Non-Metallic, Uses of. New Uses of Nonmetallic Minerals, W. M. Myers. U. S. Bur. Mines—Reports of Investigations, no. 2587, Mar. 1924, 7 pp. See also Ariz. Min. Jl., vol. 8, no. 6, Aug. 15, 1924, pp. 5-6. Discusses outstanding developments in new application of minerals; andalusite, preparation of andalusite for use, cyanite, sillimanite, beryl, spinel, and bentonite.

Radioactive. Principal Radioactive Minerals (Dei principali minerali radioattivi). Rassegna Mineraria Metallurgica e Chimica, vol. 60, no. 6, June 15, 1924, pp. 123-125. Details of minerals, their occurrence and properties.

Principal Radioactive Minerals (Principaux minéraux radioactifs), M. Legraye. Revue Universelle des Mines, vol. 2 (series 7), no. 3, May 1, 1924, pp. 176-180. Gives list of principal radioactive metals, their characteristics and occurrance. Bibliography.

Rare, Canada. The Rare Element Minerals of Canada, H. V. Ellsworth. Can. Chem. & Metallurgy, vol. 8, no. 11, Nov. 1924, pp. 261-263. Wide distribution shown of rare minerals in Canadian rocks. Promising research field for chemists in analysis of complex ores.

Saskatchewan. Mineral Possibilities of Northern Saskatchewan, E. L. Bruce. Can. Min. Jl., vol. 45, no. 26, June 27, 1924, pp. 618-621, 8 figs. Value of Keewatin rocks demonstrated; first gold found at Beaver Lake; comparison of rocks at Beaver Lake and Porcupine; copper and zinc sulphides; indications of nickel and iron.

United States. Gold, Silver, Copper, Lead, and Zinc in 1922. U. S. Geol. Surv., nos. I:22, I:23, I:24, I:25, and I:26, 1924. Five reports giving production statistics as follows: No. I:22: Utah, by V. C. Heikes, pp. 377-403; No. I:23: California and Oregon, by J. M. Hill, pp. 405-451; No. I:24: Montana, by C. N. Gerry, pp. 453-488; No. I:25: Arizona, by V. C. Heikes, pp. 489-518; and No. I:26: Colorado, by C. W. Henderson, pp. 519-556.

MINERS

Conditions Affecting Health. Underground Conditions Liable to Affect the Health of Workers

in Gold Mines on the Witwatersrand, H. Pirow. Chem., Met. & Min. Soc. S. Africa—Jl., vol. 25, no. 3, Sept. 1924, pp. 54-96, 5 figs. Results of investigations on conditions liable to affect health of underground workers, including investigations on determination, causation, prevention, allaying and dissipation of silicious dust in mine air, high temperatures in stagnant humid air, and animal tests. Bibliography.

Diseases. Miners' Beat Knee, Beat Hand and Beat Elbow, E. L. Collis and T. L. Llewellyn. Iron & Coal Trades Rev., vol. 109, no. 2956, Oct. 24, 1924, pp. 670-671. See also Colliery Guardian, vol. 128, nos. 3331 and 3332, Oct. 31 and Nov. 7, 1924, pp. 1126-1127, and 1192. Abstract of report prepared under direction of Medical Research Council of work undertaken to find improved means of preventing such afflictions; conclusions and recommendations.

Effects of High Temperatures on. Some Effects on Man of High Temperatures, W. J. McConnell and R. R. Sayers. U. S. Bur. Mines—Reports of Investigations, no. 2584, Mar. 1924, 13 pp., 8 figs. on supp. plates. Results of experiments in air temperatures above 90 deg. fahr.

Some Effects of High Air-Temperatures Upon the Miner (Sixth Report to the Committee on "The Control of Atmospheric Conditions in Hot and Deep Mines"), K. Neville. Instn. Min. Engrs.—Trans., vol. 64, part 5, Feb. 1924, pp. 284-299 and (discussion) 299-314. Brief account of elementary scientific principles involved; analysis of food and drink requirements of miners in relation to underground temperature; regulation of body temperature during work in hot air.

Lamps for. See MINERS' LAMPS.

Nutrition. The Nutrition of Miners and Their Families. Colliery Guardian, vol. 128, nos. 3318 and 3319, Aug. 1, and 8, 1924, pp. 285-286, and 354-355. Abstract from report of Medical Research Council of Committee on Quantitative Problems in Human Nutrition, dealing with needs of coal miner, his family budget, etc.

Nystagmus. Miners' Nystagmus: Its Prevention and Cure, T. L. Llewellyn. Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1064-1065. See also Colliery Guardian, vol. 127, no. 3312, June 20, 1924, pp. 1579-1580, and Instn. Min. Engrs.—Trans., vol. 68, part 1, Oct. 1924, pp. 57-68 and (discussion) 68-71, 4 figs. Deals with improvement of underground lighting conditions as means for prevention of miners' nystagmus and with general principles for treatment of diseases when established. Abstract of paper read before Min. Sec., Empire Min. & Met. Congress.

MINERS' LAMPS

Firedamp Estimation. Testing for Firedamp. Iron & Coal Trades Rev., vol. 103, no. 2918, Feb. 1, 1924, pp. 167-170, 2 figs. Report of Miners' Lamps Committee. Details of experiments made with different lamps to determine best types for gas testing in addition to their use as source of light; gas caps.

Firedamp Indicator. Phenomena of Singing Flames in Presence of Firedamp (Erscheinungen an singenden Flammen bei Anwesenheit von Schlagwettern), H. Fleissner. Berg- u. Hüttenmännisches Jahrbuch, vol. 71, no. 4, 1923, pp. 22-23, 2 figs. on supp. plate. Refers to Fleissner firedamp indicator and describes observed phenomenon which tends to make visible indication of firedamp more distinct.

"Wetterlicht" Firedamp Indicator (Schlagwetteranzeiger "Wetterlicht"), H. Martienssen. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 519-524, 4 figs. Describes new lamp in which presence of methane and its quantity can be easily indicated.

Flame Safety. Flame Safety Lamp Proves Source of Danger, D. Harrington. Coal Age, vol. 26, no. 18, Oct. 30, 1924, pp. 610-611. Review of several explosions caused by safety lamps; claims that such lamps cannot be trusted even in hands of certified officials and should never be used when shift is at work.

Miners' Flame Safety Lamps with Open-Mesh Gauzers. Iron & Coal Trades Rev., vol. 109, no. 2949, Sept. 5, 1924, pp. 396-397. Discusses tests carried out at Mines Dept. Lamp-Testing Station; photometric tests, tests in still atmospheres, gallery tests, gas testing, and flickering light.

Gas-Testing. See COAL MINES, Gas Testing.

Gas Warning with. Safety-Lamps Giving Warning of Gas, W. M. Thornton. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 249-253 and (discussion) 253-257, 4 figs. See also North of England Inst. Min. & Mech. Engrs.—Trans., vol. 74, part 4, June 1924, pp. 104-108 and (discussion) 108-112, 5 figs. Describes different types of oil and electric lamps designed to utilize additional heat in air ascending from flame so as to give indication and warning of presence of gas.

Open, Danger from. See COAL MINES, Open-Lamp Hazards.

Relighting Underground. Relighting Lamps Underground. Iron & Coal Trades Rev., vol. 108, no. 2915, Jan. 11, 1924, pp. 47-48. See also Colliery Guardian, vol. 127, no. 3289, Jan. 11, 1924, pp. 95-96. Report of Miners' Lamps Committee dealing with unlocking and relighting from an open light, relighting electrically, relighting by an internal self-contained relighter, relighting of officials' lamps, and relighting of workmen's lamps by internal relighters; summary of recommendations.

Safety. Efficiency of Safety-Lamps, J. Cooper. Min. Inst. of Scotland—Trans., vol. 45, part 3, 1924-25, pp. 77-81 and (discussion) 81-83. See also Instn. Min. Engrs.—Trans., vol. 68, part 2, Nov. 1924, pp. 168-172 and (discussion) 172-174. Details of experiments carried on at rescue-station gallery of Heriot-Watt College, Edinburgh, Scotland, covering relative illuminating power and suitability of a large number of types of lamps.

Shadowless Light. Shadowless Light in Mines (Schattenloses Grubenlicht!). Bergbau, vol. 27, no. 22, Oct. 16, 1924, pp. 600-603. Describes Peters glass or globes in which interior is lined by means of a layer of pure quartz crystals, effect of which is to intensify light, eliminate all glare and development of heat and practically all shadows.

MINES

Accident Statistics. Mine-Accident Statistics, W. W. Adams. U. S. Bur. Mines—Reports of Investigations, no. 2579, Feb. 1924, 16 pp. Analysis based on reports covering 4699 accidents during months of January to October, 1923, at coal and metal mines operated by companies coöperating with Bur. of Mines in this special inquiry.

Mine Accident Statistics, W. W. Adams. U. S. Bur. Mines—Reports of Investigations, no. 2641, Sept. 1924, 8 pp. Analysis of so-called lost-time accidents to underground workers, which includes all injuries causing disability of a temporary nature lasting longer than remainder of day or shift.

Accidents in. See ACCIDENTS, Mines and Quarries.

Air Analysis, Apparatus for. Haldane's Apparatus. Sci. & Art of Min., vol. 34, no. 17, Mar. 15, 1924, pp. 260-261, 1 fig. Description of apparatus which is largely used for mine air analysis. Consists of a gas burette about 800 mm. long, having an upper part of greater width, and pro-

vided with a three-way stopper at top. Method of analysis.

Air Conditioning. The Cooling Effect of the Rock Surrounding a Mine on the Temperature of the Mine Air (Der Einfluss des Kältemantels und des Ausgleichmantels auf die Erwärmung der Wetter), R. Lehmann. Glückauf, vol. 60, no. 7; Feb. 16, 1924, pp. 107-112, 3 figs. Temperature conditions in earth crust and how they are influenced by mine shafts; new method of determining rock temperatures in surrounding of shaft and heat emitted from it to air: points out importance of wide use of gallery insulation for maintaining cool air in deep mines.

Air Flow in. See FLOW OF AIR, Mines.

Belgian Congo. A General Note on the Country and the Minerals Being Exploited in the Katanga Province of the Belgian Congo, C. H. Luja. Chem., Met. & Min. Soc. of So. Africa—Jl., vol. 24, no. 10, Apr. 1924, pp. 245-250. Details of country, geologic features and activities of Union Minière du Haut Katanga.

Cars. See MINE CARS.

Cement Spraying. See CEMENT GUN, Mines, Application in.

Cementing Water-Carrying Fissures. Method of Cementing Water-Carrying Fissures in the Star Crosscut, C. H. Foreman. Min. & Metallurgy, vol. 5, no. 213, Sept. 1924, pp. 417-422, 8 figs. Describes methods employed in connection with development of Star mine by Sullivan Min. Co., owned jointly by Bunker Hill and Sullivan Min. & Concentrating Co. and Hecla Min. Co., work calling for a crosscut from Hecla workings on 2000 level to Star ledge. Description of cement pump.

Clearing Falls and Securing Strata. Clearing Falls and Securing Strata on Highly-Inclined Roadways, A. T. Seymour. Iron & Coal Trades Rev., vol. 108, no. 2923, Mar. 7, 1924, pp. 384-385, 12 figs. Method introduced by author for dealing with falls of roof and securing strata on highly-inclined roads in mines.

Coal. See COAL MINES.

Communication. Can Signals Be Transmitted from Mine to Surface and Vice Versa by Ground Conduction System, J. J. Jakosky. Coal Age, vol. 25, no. 15, Apr. 10, 1924, pp. 529-534, 6 figs. Transmitting and receiving apparatus should be designed to resist adverse mine conditions; signals are most effectually transmitted through ground that is neither dry nor too moist. Results of study of underground communication by U. S. Bur. of Mines.

Further Progress Made with Voice Transmission From Underground Workings to Surface, J. J. Jakosky. Coal Age, vol. 25, no. 22, May 29, 1924, pp. 801-804, 4 figs. Discusses value of wireless tests when made between mine and high-powered stations on surface; propagation affected by earth strata and sheet water; successful experiments carried on from mine locomotive.

Radio as a Method for Underground Communication in Mines, J. J. Jakosky. U. S. Bur. Mines—Reports of Investigations, no. 2599, Apr. 1924, 4 pp. Discussion of some of the factors involved in applying radio in mines.

School Boys Work Out New Radio System for Mines, A. B. McCall. Coal Age, vol. 26, no. 9, Aug. 28, 1924, pp. 293-296, 6 figs. Scheme of Springfield, Ill., High School Radio Club for transmitting voice vertically through ground; may be great aid in rescue work; previous radio communication with mines needed metallic conduction.

Concrete Construction. See CONCRETE CONSTRUCTION, REINFORCED, Mines.

Control of Working Expenditures. A Method of Controlling Working Expenditure on the Mines, E. Hay. Chem., Met. & Min. Soc. of S. Africa, vol. 25, no. 4, Oct. 1924, pp. 104-118 and 118-120. Describes system devised and applied to mines controlled by General Mining and Finance Corpn.; advantages of system.

Copper. See COPPER MINES.

Cost Accounting. Factors in Mine Cost Accounting. Eng. & Min. Jl.-Press, vol. 118, no. 12, Sept. 20, 1924, pp. 463-467. Intricate decisions involved when working charges are analyzed and apportioned.

Development. Reducing the Cost of Prospecting Isolated Mining Properties, F. A. McLean. Can. Inst. Min. & Metallurgy, no. 148, Aug. 1924, pp. 531-538, 2 figs. Discusses development of promising claims, selection of compressed air plant, type of drive, tunneling, drifting, etc.

Electric Plants. See ELECTRIC PLANTS, Mines.

Electrical Equipment. Electric Mining Equipment, Its Selection, Care and Operation, A. F. Elliott. Iron & Steel Engr., vol. 1, no. 11, Nov. 1924, pp. 576-578. Question of generated vs. purchased power; substations; motors; haulage equipment; coal-cutting machines; care and operation; organization.

Electricity in Mines in 1923. Iron & Coal Trades Rev., vol. 119, no. 2959, Nov. 14, 1924, pp. 788-790, 1 fig. Progress in use of electricity; fatal and non-fatal accidents; systematic testing; repairs of trailing cables; Inspector's comments on electrical accidents. (Abstract.) Report of H. M. Elec. Inspector of Mines.

Flameproof Design of Casings for Electrical Apparatus, D. Hay and I. C. F. Statham. Colliery Guardian, vol. 127, no. 3297, Mar. 7, 1924, pp. 603-605 (includes discussion), 2 figs. Discussion of principles involved in safe design of electrical apparatus for mines. Account of investigations carried out in mining depart. of Univ. of Sheffield, Eng. Abstract of paper read before Midland Inst. Min. Engrs. See also Iron & Coal Trades Rev., vol. 108, nos. 2922 and 2923, Feb. 29 and Mar. 7, 1924, pp. 342-343 and (discussion) 390, 5 figs and Instn. Min. Engrs.—Trans., vol. 67, part 1, Mar. 1924, pp. 23-37 and (discussion) 37-45, 6 figs.

Electrical Safety Inspection. Electrical Safety Inspection: Suggestions for Mine-Safety Engineers, L. C. Ilsley. Safety Eng., vol. 47, no. 4, Apr. 1924, pp. 168-173. Important points that should be watched by inspectors, and brief review of work of U. S. Bur. Mines in testing of electrical apparatus or equipment to determine their permissibility for use in gaseous coal mines.

Electricity in. Electricity in Mines and "Safety First," W. M. Thornton. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 5-6. Describes methods by which element of risk in use of electricity in mines can be practically eliminated.

Safety in Underground Use of Electricity, J. B. Johnson. Min. Congress Jl., vol. 10, no. 10, Oct. 1924, pp. 475-477, 1 fig. Urges that operators consider safety in underground electrical equipment first, and economy in installation, second; many recommendations made to prevent accidents.

Equipment, Maintenance of. How to Keep Mining Equipment in Satisfactory Operating Condition at All Times, J. F. MacWilliams. Coal Age, vol. 25, no. 23, June 5, 1924, pp. 843-844, 1 fig. Electrical apparatus should be supplied with rated voltage; repair of worn parts by welding and machining; pumps and fans must not be required to deliver more than their normal capacity.

Explosions. Explosions and Fires in Mines, J. T. Watson. Chem. Eng. & Min. Rev., vol. 16, no. 191, Aug. 5, 1924, pp. 427-431. Quotes five

cases furnishing irrefutable evidence that if safety lamps had been in use, with their attendant discipline, disasters would not have occurred; causes of fires in mines and their prevention.

Fire Fighting. The Functions and Practical Use of Liquefied Carbon Dioxide in Fighting Mine Fires, C. L. Jones. Coal Mine Mgmt., vol. 3, no. 3, Mar. 1924, pp. 34-35 and 52-57. Source and purity of CO_2 available; how long it should require for a mine fire to cool; heat generated by a fire, and leakage; heat dissipated; liquefied CO_2 compared with other inert gases; etc. Condensation of paper read at 12th Annual Safety Congress of Nat. Safety Assn.

Fire Prevention. Elimination of Fires Due to Winches (Bekämpfung und Verhütung von Haspelkammerbränden), R. Forstmann. Glückauf, vol. 60, no. 40, Oct. 4, 1924, pp. 891-896, 17 figs. Particulars of various devices used in Ruhr district for eliminating fire dangers, using fireproof brake blocks, etc.

Would Ventilate Mine Fire Area With Inert Gas, Jos. J. Walsh. Coal Age, vol. 25, no. 2, Jan. 10, 1924, p. 55. Why stopping intake is inadvisable; small fire area if shut in may explode.

Gas Samples, Collection of. Collection of Gas Samples. Sci. & Art of Min., vol. 34, nos. 15 and 16, Feb. 16 and Mar. 1, 1924, pp. 231 and 244-245, 2 figs. Advantages of periodic analysis of air samples; how to take sample.

Haulage. Haulage, A. Crawford. Coal Mine Mgmt., vol. 3, nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12, Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov. and Dec. 1924, pp. 38-44, 38-45 and 60, 43-49, 44-54, 43-51, 49-62, 42-48, 43-48, 43-47, 36-41 and 45-46 and 42-51, 39 figs. Construction of different types of mine cars and of electric, storage-battery, and gasoline locomotives, including calculations; rope haulage; animal haulage; mine tracks; curves.

See also MINE HAULAGE.

Haulage Accidents. Prevention of Accidents due to Runaway Tubs, I. C. F. Statham. Iron & Coal Trades Rev., vol. 108, nos. 2933 and 2934, May 16 and 23, 1924, pp. 826-830 and 870-872, 37 figs. Official statistics show that a considerable number of fatalities in underground haulage are due to runaway tubs. Causes of runaway tubs; devices available for arresting runaways when tubs are being conveyed down inclines.

Headgear. Development of Headgear With Special Reference to Iron Construction (Ueber die Entwicklung der Bergwerks-Fördergerüste unter besonderer Berücksichtigung ihrer Eisenkonstruktion), H. Torp. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 639-640, 8 figs. See also Bautechnik, vol. 2, no. 45, Oct. 17, 1924, pp. 512-513, 9 figs. Discusses headgear construction for coal mines and developments due to increasing depth of mines and increasing loads and velocities.

Hoisting in. See MINE HOISTING.

Hygrometry for Deep. Hygrometry for Deep Mines, H. S. Jones. Instn. Min. & Metallurgy—Bul., no. 240, Sept. 1924, pp. 1-47, 3 figs. Presents tables dealing with meteorology, and especially hygrometry, of ventilating air in hot and deep metal mines; gives method by which each table has been calculated, and also fundamental constants on which they depend.

Italy, Sardinia. The Tiny Mine in Sardinia (La miniera di Tiny in Sardegna), G. Castelli. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 1, July 15, 1924, pp. 5-10, 2 figs. Discusses geological formation, ore deposits, mining operations, analysis of calamine and lead ores, transportation.

Japan. Cupriferous Pyritic Deposits, Hitachi Mines, Japan, M. Watanabé and W. R. Landwehr. Economic Geology, vol. 19, no. 5, Aug. 1924, pp. 434-454, 4 figs. Discusses geological formation, structure and texture of ore deposits, mineral relations, dynamic metamorphism, etc.

Katathermometer Observations. Some Katathermometer Observations in Tonopah Mines, R. S. Lewis. Eng. & Min. Jl.-Press, vol. 117, no. 9, Mar. 1, 1924, pp. 363-366, 3 figs. Observations in mines of Tonopah, Nevada.

Lighting. See LIGHTING, Mines.

Locomotives for. See MINE LOCOMOTIVES.

Maximum-Pressure Steam, Use of. Maximum Pressure Steam and Its Use in Mine Operation (Der Höchstdruckdampf and seine Wirtschaftlichkeit im Zechenbetriebe), F. Wintermeyer. Bergbau, vol. 27, no. 20, Oct. 2, 1924, pp. 547-551, 2 figs. Discusses types of design and construction, including Atmos and Benson boilers; turbines, preheating and superheating, safety devices, etc.

Metal, Accidents in. Metal-Mine Accidents in the United States During the Calendar Year 1922, W. W. Adams. U. S. Bur. Mines—Technical Paper 354, 1924, 72 pp. Statistics covering prospects as well as producing and nonproducing mines.

Mexico. Mines of the West Coast of Mexico, P. L. Bell and H. B. MacKenzie. Ariz. Min. Jl., vol. 8, nos. 3 and 5, July 1 and Aug. 1, 1924, pp. 9, 14-16 and 19-20; and 5-6 and 49-52, 4 figs. July 1: Outline of development and activity of mines in Sonora, Mexico. Copper principal mineral product of this district; silver, lead, zinc, gold, and other metals are mined. Aug. 1: Mining in Mazatlan district and in Nayarit as well as notes on miscellaneous ore deposits.

Mine-Rescue Work. See MINE-RESCUE WORK.

Ontario. Ontario's Mines, T. F. Sutherland. Can. Min. Jl., vol. 45, no. 23, June 6, 1924, pp. 551-553. Government and mining laws; taxation; ore-extraction problems; power and labor; timber, water, and climate.

Permissible Equipment and Supplies. Permissible Explosives, Mining Equipment, and Apparatus Approved Prior to January 1, 1924, J. E. Crawshaw, L. C. Ilsley, D. J. Parker and A. C. Fieldner. U. S. Bur. Mines—Tech. Paper, no. 364, 30 pp. 1 fig. List of permissible equipment and supplies for breathing apparatus, coal-cutting machines, electric drills, electric cap lamps, flame safety lamps, shot-firing units, storage-battery locomotives, and explosives.

Pumping Plants. See PUMPING PLANTS, Mines.

Pumps. See PUMPS, CENTRIFUGAL, Mine Service.

Queensland. Mount Isa: Queensland's New Silver Lead Field. Chem. Eng. & Min. Rev., vol. 116, no. 189, June 5, 1924, pp. 335-337, 4 figs. See also Queensland Gov. Min. Jl., vol. 25, no. 289, June 14, 1924, pp. 200-204, 6 figs. Details of occurrence and workings, especially by Mt. Isa Mines Ltd. and Mt. Isa Proprietary Co.

Reconstruction of Equipment. Reconstruction Methods of the "Hecla" Electrical-Mechanical Equipment, A. C. Stevenson. Min. & Metallurgy, vol. 5, no. 210, June 1924, pp. 273-275. Outline of various steps taken and exigencies met during time of unwatering and rebuilding burnt top equipment.

Rescue Apparatus. See MINE-RESCUE APPARATUS.

Rescue Communication Systems. Mine-Rescue Communication System of the Future, J. J. Jakosky. Coal Age, vol. 25, no. 4, Jan. 24, 1924, pp. 139-140. Results of actual mine ex-

periments; high- and low-frequency penetration; modified wired radio seems to hold greatest possibilities.

Rumania. The Law on Mines (La loi sur les mines). Annales des Mines de Roumanie, vol. 7, no. 14, July 25, 1924, pp. 425-480. Text of law on mineral deposits and mines, accidents, mineral fuel, oil, ores, validity of rights, concessions, etc. (In French and Roumanian.)

Russia. Mines and Mining in Russia from 1913 to 1922 (Bergbau und Hüttenwesen Russlands in den Jahren 1913-1922. Glückauf, vol. 60, no. 26, June 28, 1924, pp. 544-549. Statistical review covering coal mines, mining and conveying, production of coke and briquets; iron mines and mining; blast furnace operation, etc.

Safety in. See MINE-RESCUE APPARATUS.

Safety Problems. Researches on Safety Problems in Mining, E. Troup. Colliery Guardian, vol. 127, no. 3310, June 6, 1924, pp. 1441-1445. See also Iron & Coal Trades Rev., vol. 18, no. 2937, June 13, 1924, pp. 1016-1023. Statement of safety problems confronting mining industry and of researches into these problems now in progress. Abstracts of papers contributed to a symposium at Empire Mining and Metallurgical Congress, Lond., June 4, 1924, as follows: Coal Mining Explosives, F. L. Nathan; Explosion of Firedamp, H. B. Dixon; Coal Dust Explosions, W. Mason; Electricity in Coal Mines, R. Nelson; Miners' Safety Lamps, R. V. Wheeler.

Safety Resolutions. Mine Inspectors' Institute Advocates Legislation Requiring Closed Lights and Permissibles, A. F. Brosky. Coal Age, vol. 25, no. 22, May 29, 1924, pp. 807-808. Resolutions adopted by Mine Inspectors' Inst. include demands for electric cap lamps in all mines, flame safety lamps where necessary, exclusive use of permissible explosives, shotfirers to fire all shots electrically, detonators to be handled exclusively by shotfirers, rock dusting of all roadways, etc.

Sanitation. Sanitation in Mines, R. R. Wayers. U. S. Bur. Mines—Miners' Circular, no. 28, 1924, 14 pp. Deals with drinking water; sewage disposal, and ventilation.

Shaft House, Replacing. Moving a Shaft House, Geo. D. McLeod. Can. Min. Jl., vol. 45, no. 42, Oct. 17, 1924, pp. 1024-1027, 6 figs. Describes work done at mine in Northern Michigan in replacing old wooden shaft house with new one of steel, without interruption of hoisting.

Shaft Sinking. See SHAFT SINKING.

Shafts. See MINE SHAFTS.

Signaling. See MINE SIGNALING.

Slushing, Loading Device for. Loading Device for Slushing, I. W. Farrand. Eng. & Min. Jl.-Press, vol. 117, no. 13, Mar. 29, 1924, pp. 531-532, 6 figs. Describes device consisting of a four-wheeled steel-frame truck equipped with two vertical air cylinders, each operated by a four-way valve, which has given satisfactory results in drifts and tunnels of mines of Cerro de Pasco Copper Corpn.

Subsidence. Mining Subsidence. Surveyors' Instn.—Jl., vol. 3, part 12, June 1924, pp. 265-288. Discussion of paper by C. H. Bailey.

Substations for, Automatic. See SUBSTATIONS, Automatic.

Surveying. Notes on Borehole Surveying, G. A. Watermeyer. Chem., Met. & Bin. Soc. of S. Africa—Jl., vol. 24, no. 6, Dec. 1923, pp. 145-151, 5 figs. Notes on instruments patented for purpose of surveying bore-holes, some of which author has tested in practice.

Orientation in the Interior of Mines (Riktning av schakt och orter i en gruva), F. W. Berger. Teknisk Tidskrift, vol. 54, no. 32, Aug. 9, 1924, pp. 57-61, 10 figs. (Bergsvetenskap). Method of surveying in interior of mines so as to determine direction in which work has to be carried forward.

Use of Geophysical Investigations to the Mining Engineer (Welchen Nutzen bringen die geophysikalischen Untersuchungs-methoden den Bergbautreibenden?), G. Glockemeier. Metall u. Erz, vol. 21, nos. 8 and 9, Apr. and May 1924, pp. 165-172 and 189-203, 32 figs. Discusses theory, apparatus and applications of magnetic, gravitational, and electric methods of investigation, and explains them by typical examples.

Surveying Instruments. Improvements in Mine Surveying Instruments (Ueber Fortschritte im Bau der Grubenvermessungsinstrumente), H. Marchand. Montanistische Rundschau, vol. 16, no. 17, Sept. 1, 1924, pp. 464-467, 4 figs. Design and operation of recent theodolites for mine surveying built by Breithaupt.

Taxation, British Columbia. The Taxation of Mines in British Columbia, J. W. Bingay. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 586-588. Points out necessity for lower taxation.

Temperature Measurement. Apparatus for the Measurement of Temperatures in Deep Wells by Means of Maximum Thermometers, C. E. Van Orstrand. Economic Geology, vol. 19, no. 3, Apr.-May 1924, pp. 229-248, 11 figs. Mercurial thermometers; apparatus for lowering mercury thermometers into deep wells; practical suggestions: accuracy and efficiency. Pub. with permission of U. S. Geol. Surv.

Temperature Regulation. Mine Temperature and Possibility of Controlling It (Die Bildung der Grubentemperaturen und die Möglichkeiten der Beeinflussung), F. Heise and K. Drekopf. Glückauf, vol. 60, nos. 28 and 29, July 12 and 19, 1924, pp. 583-590 and 607-614, 16 figs. Analyses mine temperature to obtain numerical values for separate factors and then proceeds to discuss possibility of influencing them artificially.

Temperatures. Effect of Hot and Cold Waves on Mine Temperatures (Die Wirkung von Hitze- und Kältewellen auf die Temperaturen des Wetterstromes), F. Heise and K. Drekopf. Glückauf, vol. 60, no. 39, Sept. 27, 1924, pp. 863-867, 12 figs. Discusses yearly and daily temperature fluctuation, night and winter cooling, influence of heat waves, and makes calculations.

Timbering. See MINE TIMBERING.

Tracks, Open-Pit. Tracks for Open-Pit Mines, W. R. Brown. Min. Congress Jl., vol. 10, no. 4, Apr. 1924, pp. 169-170. Standardizing open-pit track equipment; discusses items susceptible of standardization including rails, ties, spikes, splice bars and frog and switches.

Transportation Standardization. Standardizing Underground Transportation. Min. Congress Jl., vol. 10, no. 3, Mar. 1924, pp. 135-141, 9 figs. Recommendations of committee of Am. Min. Congress for tentative standards, including coal mine car design, hand brakes, mine car wheels, mine tracks and signals and locomotives.

Turkestan. A Reconnaissance in Turkestan and Southern Siberia, Wm. Roberts. Min. Mag., vol. 30, no. 6, June 1924, pp. 329-338, 7 figs. Describes journey of investigation into mineral districts in Asiatic region at present little known in England.

U. S. A. Gold, Silver, Copper, Lead, and Zinc in the Eastern States in 1923, J. P. Dunlop. U. S. Geol. Survey, no. I:1, July 7, 1924, 7 pp. Statistics of production by states.

Valuation. Should Mines Be Subjected to a Yearly Valuation?, C. P. McCormack. Coal Age, vol. 26, no. 5, July 31, 1924, pp. 145-148. As probable life of mine changes with development,

as market requirements and conditions modify profits and as such changes demand operating and financial reconstructions, frequent revaluations are desirable.

Ventilation. Economy and Efficiency in Ventilation. Instn. Min. Engrs.—Trans., vol. 67, part 1, Mar. 1924, pp. 1-12, 2 figs. Discussion on J. Parker's paper by above title published in Instn. Min. Engrs.—Trans., vol. 66, 1923-24, pp. 14, 69 and 181, and in Min. Inst. Scotland—Trans., vol. 44, part 6, 1923-1924, pp. 157-168, 2 figs. Discussion.

Efficiency of Jet Nozzles in Air Conduits (Der Wirkungsgrad von Strahldüsen in Wetterlutten), J. Maercks. Glückauf, vol. 60, no. 45, Nov. 8, 1924, pp. 1027-1032, 16 figs. Discusses isothermal efficiency of compressed-air nozzles and its determination, nozzle efficiency as a function of air velocity, and calculation of number of nozzles.

Tests on the Leakage of Mine Ventilating Doors, J. W. Paul, G. E. McElroy and H. P. Greenwald. Colliery Engr., vol. 1, no. 6, Aug. 1924, p. 262. Report of investigation; object of tests was to determine leakage of two air locks which had been placed in experimental mine as part of equipment for tests on friction factors.

The Application of Refrigeration to the Ventilation of Mines, F. A. Willcox and J. D. Farmer. Ice & Cold Storage, vol. 27, no. 318, Sept. 1924, pp. 235-239. Deals with two mines, one in Brazil and other on Continent. Abstract of paper read before Fourth Int. Congress of Refrigeration, Commission III.

The Theory of Ventilation, D. Hay. Iron & Coal Trades Rev., vol. 108, nos. 2927, 2928 and 2929, Apr. 4, 11 and 18, 1924, pp. 554-555 and (discussion) 601-602 and 634. See also Colliery Guardian, vol. 127, nos. 3302, 3303, 3304, and 3305, Apr. 11, 17, 25, and May 2, 1924, pp. 927-928 and (discussion) 992-993, 1056-1057 and 1122; and Domestic Eng. (Lond.), vol. 44, no. 8, Aug. 1924, pp. 172-175. Presents plea for codification of treatment, and discusses proposed selection of various units in form most suited for practical calculations. First report of Midland Inst. Min. Engrs. Committee of Ventilation of Mines.

The True Effect of Natural Ventilation in Deep Mines, R. Clive. Iron & Coal Trade Rev., vol. 108, nos. 2927, 2928 and 2929, Apr. 4, 11 and 18, 1924, pp. 558-559, 593 and (discussion) 601-602 and 634, 1 fig. Details of experiments and results obtained. Refers also to effect due to shaft resistance and resistance at shaft-mouthings, and variation due to observation errors, etc. Second report of Midland Inst. Min. Engrs. Committee of Ventilation of Mines. See also Colliery Guardian, vol. 127, nos. 3302, 3303, 3304, and 3305, Apr. 11, 17, 25, and May 2, 1924, pp. 929-931 and (discussion) 992-993, 1056-1057, and 1122, and (reply to discussion) in 3306, May 9, 1924, pp. 1192-1193.

The Ventilation of Mines, Douglas Hay and Rob. Clive. Instn. Min. Engrs.—Trans., vol. 67, part 5, Aug. 1924, pp. 411-442, 12 figs., partly on supp. plate. See also Colliery Guardian, vol. 127, no. 3310, June 6, 1924, pp. 1447-1449, 2 figs. Sci. and Art of Min., vol. 34, no. 23, June 7, 1924, pp. 354-355; Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1058-1061, 6 figs. Need and principles of ventilation; modes of production of ventilation; modern ventilators and surface arrangements; hot and deep mines; ventilation practice in laying out mines underground; review of existing conditions; research.

Ventilating Mines by Exhaust Steam. Colliery Guardian, vol. 128, no. 3319, Aug. 8, 1924, pp. 356-357, 1 fig. Details of British patent no. 212802, improved method of utilizing heat liberated by condensation of exhaust steam for heating outgoing air, steam being derived from mine engines installed above or below ground.

Ventilation and the Miner's Efficiency, R. S. Lewis. Salt Lake Min. Rev., vol. 26, no. 1, Apr. 15, 1924, pp. 19-21. Man's endurance of high temperatures; natural temperatures of deep mines; kata-thermometer for air testing, and some of its other uses; etc.

Ventilation as an Agent in the Prevention of Miners' Phthisis on the Witwatersrand, C. J. Gray. S. African Eng., vol. 35, nos. 9 and 10, Sept. and Oct. 1924, pp. 180-181 and 207-210, 3 figs. General impression of lines of thought and practice being followed.

Ventilation Problems at Champion Reef Mine, C. F. Heathcote. Instn. Min. & Metallurgy—Bul, no. 233. Feb. 1924, 40 pp., 4 figs.

Waste-Steam Ventilation, a New Method of Waste-Heat Utilization in Mines (Die Abdampfbewetterung, eine neue Art der Abdampfverwertung auf Bergwerken), Heise. Wärme, vol. 47, no. 8, Feb. 22, 1924, pp. 77-80. Difficulties in overcoming vapor from steam engines in underground mines; application of air condensation making use of outgoing air current; advantages for ventilation; volume of steam and condensation area required; calculation of costs.

See also Katathermometer Observations; BLOWERS, Mine Ventilation; FANS, Mine; VENTILATION, Still-Air Conditions, Temperatures for.

Water Neutralization. Neutralization of Mine Water in Don Basin, G. Lomoff. Russian Min. Jl., vol. 100, no. 4-5, Apr.-May 1924, pp. 425-428, 2 figs. Practice in a region where mine water contains three oxides. (In Russian.)

Water Supply. Using Mine and Shaft Water in the Mines of the Ruhr (Die Verwendung von Gruben- und Schachtwasser auf den Zechen in Ruhrbezirk), W. Trümpelmann. Glückauf, vol. 60, no. 36, Sept. 6, 1924, pp. 783-789. Origin, composition and use of mine waters; salt content and hardness preventing use; improvements of mine water; etc.

Welfare Work. Miners' Welfare Problems in Sierra de Cartagena (Problema social-minero de la Sierra de Cartagena), B. Rolandi. Revista Minera Metalurgica y de Ingenieria, vol. 75, nos. 2940 and 2941, Aug. 16 and 24, 1924, pp. 471-473 and 475, and 481-484. Details of report by Inst. Social Reform, discussing housing conditions, rents, wages and payment, accidents and their causes, transportation difficulties, etc.

MINING

Alaska. Mining in Alaska in 1923. Min. Congress Jl., vol. 10, no. 1, Jan. 1924, pp. 39-41, 2 figs. Value of mineral production greater than 1922; decrease in gold production, but coal and copper production increased about 20 per cent.

Australia. An Outline of Mining Practice in Australia. Chem. Eng. & Min. Rev., vol. 17, nos. 193, 194, and 195, Oct., Nov., and Dec. 1924, pp. 7-9, 53-55 and 97-100. Oct.: Methods at Broken Hill, N. S. W. Nov.: Methods at Kalgoorlie, W. A. Dec.: Methods at Mt. Morgan, Mt. Lyell, and Mt. Bischoff, Tasmania. Extracted from paper read at Empire Min. & Met. Congress, Lond.

Boreholes. See BOREHOLES.

British Columbia. Conditions Affecting Mining in British Columbia, R. W. Brock. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 597-607. Deals with physical, geological, and artificial conditions.

Northwestern British Columbia, G. Hanson. Can. Min. Jl., vol. 45, no. 22, May 30, 1924, pp. 521-524, 5 figs. Summary description of active

mines and areas favorable for prospecting. Pub. with permission Ottawa Geol. Surv.

The Opportunity for Mining Investment in British Columbia, H. G. Nichols. Can. Inst. Min. & Met.—Bul., no. 144, Apr. 1924, pp. 213-225. Outlines some of the mining possibilities in British Columbia, considers factors affecting investment, and attempts an appraisal of opportunity presented.

British Empire. Mining Throughout the Empire. Min. Jl., vol. 145, no. 4635, June 21, 1924, 80 pp., 20 figs. Review of mineral resources and activities carried on all over world under British flag, and by undertakings depending on British enterprise and British capital.

California. Chapter of Report XX of the State Mineralogist Covering Mining in California and the Activities of the State Mining Bureau, Cal. State Min. Bur., Min. in Cal., vol. 20, no. 1, Jan. 1924, 72 pp., 11 figs., partly on supp. plate. Report of development and mining activities of the state, prepared by district mining engineers.

Coal. See COAL MINING.

Drilling. See DRILLING.

Geophysics in. Task of Geophysical Advisers in Mining (Die Aufgaben geophysikalischer Berater im Bergbau). Zeit. des Internationalen Vereines der Bohringenieure u. Bohrtechniker, vol. 32, no. 24, Dec. 15, 1924, pp. 188-190. Role of geophysical experts in aiding practical geology, prospecting, etc.

Hydraulic Stowing. Hydraulic Stowing at the Villeboeuf Mines, E. Jaboulay. Iron & Coal Trades Rev., vol. 109, no. 2945, Aug. 8, 1924, pp. 243-244, 3 figs. Details of design and construction of hydraulic stowing plant at Villeboeuf mines, France; advantages gained. Translated from Revue de l'Industrie Minérale.

Metal, Economics of. The Economics of Metalliferous Mining, H. Louis and H. F. Marriott. Iron & Coal Trades Rev., vol. 108, no. 2940, July 4, 1924, p. 15. See also So. African Min. & Eng. Jl., vol. 35, nos. 1709, 1711, and 1714, June 28, July 12, and Aug. 2, 1924, pp. 1167, 1242, and 1315; and So. African Eng., vol. 35, no. 7, July 31, 1924, pp. 143-146. Considers two methods in studying cost of production in ironstone mine, lead mine, copper mine and smelting works, and tin mine. Abstract of paper read before Empire Min. & Met. Congress.

Microscopic Investigation, Application of. Mineralography as an Aid to Mining, E. Thomson. Can. Inst. Min. & Met.—Bul., no. 144, Apr. 1924, pp. 231-237, 12 figs. Determination of opaque minerals by microscopic investigation; practical directions in which this method may be applied.

Newfoundland. Mining and Metallurgy in Newfoundland, D. J. Davies. Instn. Min. & Metallurgy —Bul., no. 243, Dec. 1924, 8 pp. Geology, iron ore, copper possibilities, lead ores, and nonmetallic minerals of Newfoundland.

Nova Scotia. Metalliferous Mining in Nova Scotia During 1923, A. E. Flynn. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 33-35. Reasons for low gold assays from dumps; arsenic ores; Harr concentrator; gold mining; gypsum mining; other minerals.

Ontario, Canada. Mining in Ontario in 1923, T. W. Gibson. Can. Min. Jl., vol. 45, no. 2, Jan. 11, 1924, pp. 45-46. Notes on nickel, gold, and silver.

Physiological Problems. Physiological Problems in Mining, J. S. Haldane. Can. Min. Jl., vol. 45, nos. 38, 39, and 40, Sept. 19, 26, and Oct. 3, 1924, pp. 932-933, 957-959, and 987-989. Sept. 19: Gases met with in mines. Sept. 26: Heat in mines. Oct. 3: Dust in mines; underground infections. See also (abstract) in Chem. Eng. & Min. Rev., vol. 17, no. 194, Nov. 1924, pp. 59-63; Instn. Min. Engrs.—Trans., vol. 68, part 1, Oct. 1924, pp. 34-47 and (discussion) 47-56; and Colliery Guardian, vol. 127, no. 3311, June 13, 1924, pp. 1507-1508.

Quebec. Mining Activities in Quebec during the Year 1923, A. O. Dufresne. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 28-30, 1 fig. Activities in gold belt; gold companies and syndicates; transportation and other facilities; activities of asbestos mines and mills; new construction; non-metallics.

Rock Containing Oil and Gas. Methods of Mining Loose or Semi-disintegrated Rock Containing Oil and Gas (Ueber die Methode rollige, halbfeste oder öl- und gasreiche Gebirgsmassen zu durchörtern und abzubauen), G. Schneiders. Petroleum, vol. 20, no. 27, Sept. 20, 1924, pp. 1377-1384. Describes shield method used in tunnel construction and its application in mining; details of English and American tunneling work.

Russia. New Russian Mining Law of 7-13 July 1923 and Petroleum (Das neue russische Berggesetz vom 7. bezw. 13. Juli 1923 und das Erdöl), H. Pohl. Petroleum, vol. 20, no. 19, July 1, 1924, pp. 905-910. Text of law covering prospecting, concessions, rights and duties of concessionaires.

Scrapers. Use of Scrapers in Narrow Veins, A. S. Wingher. Eng. & Min. Jl.-Press, vol. 118, no. 16, Oct. 18, 1924, pp. 618-619, 2 figs. Describes practice in mine of Utah Consolidated Min. Co., at Bingham Canyon.

Skip Changing. Homestake Method of Changing Skips, Felix Edgar Wormser. Eng. & Min. Jl.-Press, vol. 117, no. 26, June 28, 1924, pp. 1044-1045, 4 figs. Change is made at bottom of shaft instead of on surface.

Standardization. Standardization Applied to Metal Mining, Chas. A. Mitke. Min. Congress Jl., vol. 10, no. 4, Apr. 1924, pp. 147-148. Points out that standardization is absolute necessity. See also article entitled, Application of Standardization to Metal Mining, L. Eaton, pp. 149-150.

Time Study in. See TIME STUDY, Mining.

MINING INDUSTRY

Bolivia. Mining in Bolivia, H. L. Venables and E. J. Howard-Wright. Min. Mag., vol. 31, no. 6, Dec. 1924, pp. 350-355, 1 fig. Review of mining industry of Bolivia and general information relating to individual operating companies, taxes, legal conditions, etc.

Gaussian Curve, Application of. Application of Gaussian Curve to Mining Industry, H. Archbald. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1355-M, July 1924, 11 pp., 3 figs. It is possible to construct a simple diagram of earnings, or production, of men employed at a coal mine that will show not only if conditions tend toward contentment among men, but if operating distribution of work is correct. Basis of such a diagram would be Gaussian curve of normal variation in human ability. Shows how this may be done. Gives curves and tables.

Pacific Coast, United States. Trend of Mining Industries on the Pacific Coast, G. J. Young. Eng. & Min. Jl.-Press, vol. 118, no. 4, July 26, 1924, pp. 135-136. Discusses lead, zinc, gold and silver production of Pacific region.

Russia. See IRON AND STEEL, Russian Industry.

Water Power, Use in. Water Power in the Mining Industry. Can. Min. Jl., vol. 45, no. 27, July 4, 1924, pp. 648-652, 4 figs. General résumé of study made by Dominion Water Power Branch, Dept. Interior, of extent to which need of ample supplies of power available at cost that will permit of production and treatment

of large quantities of raw materials in districts in which mines occur, has been met by development of Canadian advantageously located water powers.

MINING LAWS

British Columbia. Mining Laws of British Columbia and Some Notes on Blue Sky Legislation, A. M. Whiteside. Can. Inst. Min. & Metallurgy—Bul., no. 149, Sept. 1924, pp. 574-585. Discussion of laws bearings upon economics of mining in British Columbia.

England. The Principles and Operation of the Mines (Working Facilities and Support) Act, 1923, Part I, J. H. Cockburn. Colliery Guardian, vol. 128, nos. 3338 and 3339, Dec. 19 and 24, 1924, pp. 1559-1561 and 1623-1625. Abridgment of paper read before Midland Inst. Min. Engrs.

Ontario. See MINES, Ontario.

Petroleum Exploitation and Storage. Roumania's New Mining Laws. Petroleum Times, vol. 12, nos. 303 and 305, Oct. 25 and Nov. 8, 1924, pp. 637-640 and 725-728, 1 fig. Oct. 25: Complete details of regulations applying to petroleum exploitation and storage. Nov. 8: Full text of regulations dealing with validation of acquired rights.

MISTS. See GASES, Mists, Analysis of.

MIXERS. See LIQUIDS, Mixing Apparatus.

MODELS

Use in Engineering. The Use of Models in Engineering, A. H. Gibson. Instn. Mech. Engrs.—Proc., no. 1, 1924, pp. 53-64. Points out that, when used with judgment, model experiments are capable of giving results of highest value, afford unique method of attack in more complex problems, and extension of their use by engineering investigators appears to offer very fruitful field of research.

MOLDING MACHINES

Applications. Molding Machine Practice, R. R. Clarke. Metal Industry (N. Y.), vol. 22, nos. 6 and 7, June and July 1924, pp. 237-238 and 272-275, 8 figs. Range of application, difficulties, and solution of difficulties. Various methods of pattern-mounting.

Brass-Foundry Practice. Molding Machine Practice, N. F. Flanagan. Metal Industry (N. Y.), vol. 22, no. 1, Jan. 1924, pp. 5-6. How molding machine is put to work in brass foundry; discusses core making, mold making, fast molding, and molding board sizes.

Hand-Operated. Hand-Operated Molding Machine With Flasks, "Patent Voss" (Die kastenlose Handformmaschine "Patent Voss"). Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 42, Oct. 19, 1924, pp. 330-332, 3 figs. Molding machine as well as work bench of molder are moved along as work progresses and a man can begin and finish a mold without changing his position; use of this machine increases production about 200 per cent.

Hydraulic. New Hydraulic Molding Machine (Eine neue hydraulische Pressformmaschine). Zeit. für die gesamte Giessereipraxis, vol. 45, no. 39, Sept. 28, 1924, pp. 306-307, 3 figs. Design and operation of machine of simple construction, requiring small space and having large field of application.

Hydraulic vs. Jarring. Hydraulic vs Jarring Molding Machine (Hydraulische oder Rüttelformmaschine?), V. Zsák. Giesserei-Zeitung, vol. 21, no. 1, Jan. 1, 1924, pp. 1-5, 8 figs. Nature of sand packing with molding press and jarring machine; it is shown that for up to 24-in. boxes only hydraulic molding machines can be used; for boxes from 24 to 40 in. both systems are equally good; for boxes over 40 in. only jarring molding machine can be used.

Movable. Movable Molding Machine for Large Work. Iron Age, vol. 114, no. 5, July 31, 1924, pp. 247-249, 4 figs. Describes traveling sand mixer and rammer which handles molding for 12 to 14-ton castings, developed by foundry of Marion Steam Shovel Co., Marion, Ohio.

Sand-Dressing and Pig-Molding. Sand-Dressing and Pig-Molding Machine for the Molding of Blast-Furnace Pigs (Sandaufbereitungs- und Masselformmaschine zum Formen von Hochofenmasseln), M. Paschke. Stahl u. Eisen, vol. 44, no. 52, Dec. 25, 1924, pp. 1771-1772, 2 figs. Describes operation of machine, its manipulation and performance.

Sandslinger. Recent Developments in Moulding Practice. Eng. Production, vol. 7, no. 143, Aug. 1924, p. 233, 2 figs. Details of design and construction of Sandslinger machines.

Selection and Operation. Why Molding Machines? C. W. Miller. Metal Industry (N. Y.), vol. 22, no. 4, Apr. 1924, pp. 146-147. Conditions under which it is advisable to use machines in brass foundry, and when it is poor policy to use them; types best suited to different classes of work; methods of handling and operating to get best results; difficulties which may be encountered and how to overcome them; quality of machine-made castings.

Types. Machine Molding and Molding machines (Maschinenformerei und Formmaschinen), Praktische Maschinen-Konstrukteur, vol. 57, nos. 37 and 41, Sept. 30 and Oct. 28, 1924, pp. 509-511 and 557-559, 16 figs. Discusses advantages of machine molding and describes usual types of machines used. Management of complicated patterns.

Moulding Machines, J. McClelland. Foundry Trade Jl., vol. 30, no. 413, July 17, 1924, pp. 57-60 (includes discussion), 7 figs. Describes hand-operated, power, and jolt-ramming machines, and a boxless machine.

New Molding Machines (Les nouvelles machines à mouler). Fonderie Moderne, vol. 18, Apr. 1924, pp. 100-103, 7 figs. Describes two new machines patented by Glaenzer & Perreaud, for production of foundry cores.

Types of Molding Machines, R. E. Search. Metal Industry (N. Y.), vol. 22, nos. 8, 10, and 11, Aug., Oct., and Nov., 1924, pp. 315-317, 397-398, and 442-443, 10 figs. Describes stripping plate, jar ramming, and turn-over machines through representative types made in United States and abroad.

MOLDING METHODS

Aluminum Crankcases. See CRANKCASES, Aluminum, Molding.

Condensers. A Method of Moulding a Condenser. Foundry Trade Jl., vol. 30, no. 415, July 31, 1924, pp. 101-102, 4 figs. Practical details of molding and core making for making of a condenser. Main dimensions of casting are: Depth, with top and bottom flanges, approximately 8 ft.; diameter, 10 ft.; inside diameter of body, 9 ft.; thickness of metal 1½ in.

Cylinder Stuffing Box. Moulding a L.P. Cylinder Stuffing Box, B. Shaw and J. Edgar. Foundry Trade Jl., vol. 29, no. 395, Mar. 13, 1924, pp. 211-212, 7 figs. Describes successive operations.

Electric-Motor End Brackets. Molding Motor End Brackets. Foundry, vol. 52, no. 18, Sept. 15, 1924, pp. 735-736, 4 figs. Equipment and methods employed in producing standardized work in Westinghouse Elec. & Mfg. Co. foundry at Cleveland, Ohio, which is typical of manner in which jobs of a similar nature are handled to aid production.

Gear Cases. See GEARS, Cases.

Green-Sand Molding. Hints on Green-Sand Moulding, C. H. Brown. Foundry Trade Jl., vol. 29, no. 399, Apr. 10, 1924, pp. 297-298 (includes discussion). Ramming of mold, venting of molds, effects of bad gating, burning on castings, etc.

Jolt-Ramming. Jolt-Ramming Moulding Practice, A. L. Key. Foundry Trade Jl., vol. 29, no. 397, Mar. 27, 1924, pp. 249-251, 8 figs. Describes author's practice. Principles, advantages, types of machines and installations, layout and tackle.

Pipe, Special Shapes. Molding Special Pipe Shapes, P. Dwyer. Foundry, vol. 52, no. 10, May 15, 1924, pp. 373-378, 10 figs. Equipment developed for production of large valves and special shapes which usually are ordered in single units or in limited numbers; practice of Pittsburgh Valve, Foundry & Constr. Co.

Propellers. Molding a Propeller in Loam, L. V. Johnston. Foundry, vol. 52, no. 11, June 1, 1924, pp. 446-448, 1 fig. Methods and rigging employed for purpose; necessity for skill and observance of care and accuracy.

Sweeps a Differential Pitch, J. Edgar. Foundry, vol. 52, no. 2, Jan. 15, 1924, pp. 51-52, 7 figs. Describes characteristics peculiar to propellers in which pitch varies from that of a true screw; method employed in foundry to make mold.

Spiral Drums. Molding Spiral Drum From Pattern Swept in Loam, J. Taylor. Can. Foundryman, vol. 25, no. 4, Apr. 1924, pp. 12-14, 7 figs. Pattern swept on arbor in similar manner to sweeping cam core; molded same as wooden pattern; core also swept in.

Turbine Casing. Makes Heavy Turbine Casing, J. Shaw. Foundry, vol. 52, no. 19, Oct. 1, 1924, pp. 776-778, 5 figs. Detailed description of molding methods employed in producing a 15,000-kw. turbine casing, bottom half, exhaust end, in foundry of Brightside Foundry & Eng. Co., Ltd., Sheffield, Eng.

Turbine Wheel. Cores Play Prominent Part in Molding Turbine, F. H. Bell. Can. Foundryman, vol. 15, no. 10, Oct. 1924, pp. 39-42 and 59, 8 figs. Describes molding of water wheel at foundry of Canadian Gen. Elec. Co., Toronto.

MOLDS

Cast-Steel. Comparison of Cast Steel and Iron Ingot Molds, Fr. Schivetz. Forging—Stamping—Heat Treating, vol. 10, no. 3, Mar. 1924, pp. 123-125. Account of author's experiments with steel ingot molds, from which he concludes that great distrust toward steel molds is not wholly warranted; with properly chosen pouring method and careful observance of all physical properties, favorable economic results can be obtained. Translated from Stahl u. Eisen, Dec. 28, 1922. See reference to original article in Eng. Index 1922, p. 431, last item on page.

Drier for. Designs Portable Gas Mold Dryer, A. Zander. Foundry, vol. 52, no. 12, June 15, 1924, p. 482, 2 figs. Apparatus for drying molds with manufactured gas, which is applicable to great variety of work, introduced at Kedzie Foundry Co., Chicago.

Hardness Testing and Measuring. A Hardness Testing Apparatus for Moulds and Cores, L. Treuheit. Foundry Trade Jl., vol. 29, no. 387, Jan. 17, 1924, pp. 50-51, 3 figs. Describes horizontal and vertical mold-testing devices designed similarly to Brinell testing machine to determine hardness of molds and cores in gr. per. sq. mm., and in this manner to obtain a real supervision of all parts, and thereby ensure clean castings with a reduction in wasters. From paper read before Hamburg Conference of German Foundrymen.

A New Method of Measuring the Hardness of Molds, E. Ronceray. Am. Foundrymen's Assn.—Advance Paper no. 443, for meeting Oct. 11-16, 1924, 3 figs. Describes small mold-hardness meter designed for studying systematically methods of mold ramming actually in use; apparatus is based on principle of Brinell ball hardness tester; results of tests.

Long-Life. Making Long Life Molds, O. Smalley. Foundry, vol. 52, no. 8, Apr. 15, 1924, pp. 294-297. Details of refractory mixtures which give satisfactory service; record of series of tests under shop conditions; plaster, paper pulp, ganister, carborundum and monazite among materials used.

Permanent. Discusses Permanent Molds, R. J. Anderson and M. E. Boyd. Foundry, vol. 52, nos. 12 and 13, June 15 and July 1, 1924, pp. 463-468 and 510-513, 17 figs. Describes five different permanent-mold processes and discusses principles involved; typical molds; materials for molds and cores; mold design; methods of gating; various types of commercial alloys and typical castings. Annual exchange paper of Am. Foundrymen's Assn. presented at Inst. Brit. Foundrymen. See also Foundry Trade Jl., vol. 29, nos. 407 and 408, June 5 and 12, 1924, pp. 464-468 and 477-485, 17 figs. Bibliography.

Sand for. See SAND, MOLDING.

Supports. See CORES, Supports.

MOLER

Properties and Uses. Moler and Its Applications (Le moler et ses applications), P. Hannover. Chimie & Industrie, vol. 12, no. 5, Nov. 1924, pp. 807-815, 6 figs. Discusses deposits, properties, and uses of moler, a species of diatomaceous earth; manufacture of silica-lime brick; working of deposits; characteristics of moler bricks; use in hydraulic mortars.

MOLYBDENUM

Applicability as Alloying Constituent. Molybdenum, Its Alloys and Its Applicability as an Alloying Constituent, P. Powell. Brass World, vol. 20, nos. 2, 4, and 5, Feb., Apr., and May, 1924, pp. 47-51, 117-123, and 157-162, 40 figs. Compiled and abstracted from various sources, chiefly from address delivered by Guertler before German Met. Soc. in Apr. 1922, and from investigations of C. Lehmer and those of Lautsch and G. Tammann, and other authorities.

Binary and Ternary Alloys of. Investigations of Binary and Ternary Molybdenum Alloys (Untersuchungen binärer und ternärer Molybdänlegierungen), Dreibholz. Zeit. für Physikalische Chemie, vol. 108, no. 1-2, 1924, pp. 1-50, 25 figs. Copper, silver, and gold form no alloys with molybdenum; melting point of copper is not raised by addition of molybdenum, nor that of molybdenum reduced by addition of copper; platinum is capable of forming alloys with molybdenum; copper-nickel alloys are not improved in their tenacity or electrical properties by addition of molybdenum; addition of molybdenum to nickel increases hardness. Bibliography.

Deoxidizer, Use in. Molybdenum and Its Ferroalloys (La industria del molibdeno y sus ferroaleaciones), A. Comba and Sigüenza. Ingeniería y Construcción, vol. 2, no. 19, July 1924, pp. 314-315. Discusses molybdenum as a deoxidizing agent in steel works, replacing aluminum and manganese, and its production in electric furnace.

Thermal Expansion. Thermal Expansion of Molybdenum, P. Hidnert and W. B. Gero. U. S. Bur. Standards—Sci. Papers, no. 488, May 5, 1924, pp. 429-444, 9 figs. Gives results in figures and tables of expansion tests made for various

temperature ranges between room temperature and 750 deg. cent. on molybdenum ingots prepared from fine and coarse grained molybdenum powders and on samples swaged to various diameters.

MOLYBDENUM STEEL

Physical Properties. Molybdenum Steel—Some Production Data, E. W. Pierce. Am. Soc. for Steel Treating—Trans., vol. 5, no. 6, June 1924, pp. 571-576. Merits of molybdenum and chromium as alloying elements in structural steels, as compared with chrome-nickel steels. Physical properties, and actual cost of production and fabrication.

MONEL METAL

Corrosion. Corrosion of Monel Metal in Photographic Solutions, J. I. Crabtree and G. E. Matthews. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 671-675, 13 figs. Details of corrosion of monel metal when in contact with acids in photographic utensils.

Impact Testing. See IMPACT TESTING, Notched-Bar Tests.

Welding. Welding Monel Metal. Can. Machy., vol. 32, no. 12, Sept. 18, 1924, pp. 39-40, 2 figs. Discusses precautions to be observed in welding of monel metal which are not ordinarily followed in welding steel.

Welding Monel Metal and Nickel. Welding Engr., vol. 9, no. 3, Mar. 1924, pp. 25 and 28-29, 8 figs. Correct procedure for welding by oxy-acetylene, metallic-arc, carbon-arc, and resistance methods.

See also OXY-ACETYLENE WELDING, Monel Metal.

Working and Uses. Technical Experiences With Monel Metal (Betriebstechnische Erfahrungen mit Monel-Metall), H. Krüger. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1085-1087, 3 figs. Discusses welding, casting, working, and uses.

MORTARS

Alkali, Effect on. Effect of Alkali on Strength of Mortar, Chas. E. Proudley. Pub. Roads, vol. 5, no. 3, May 1924, pp. 25-26, 2 figs. Tests of mortar briquets made in laboratory of U. S. Bur. of Pub. Roads to determine to what extent presence of alkali in mixing water is harmful.

Cement. Further Investigation as to Suitable Grain Composition of Current Mortar in Concrete (Weitere Untersuchungen über die zweckmässige Kornzusammensetzung des Zementmörtels im Beton), O. Graf. Bauingenieur, vol. 5, no. 22, Nov. 25, 1924, pp. 736-740, 12 figs. Discusses dependence of compression strength and tensile strength on composition of sand, and gives tables and graphs summarizing results.

Cement, Contraction and Swelling. See CONCRETE, Contraction and Swelling.

Cement Methods. See CONCRETE, Cement Methods.

Composition. Investigation as to the Best Composition of Hydraulic Mortars and Concretes (Estudios de investigación sobre la mejor composición de los morteros y hormigones hidráulicos), R. Feret. Ingeniería y Construcción, vol. 2, no. 19, July 1924, pp. 289-302, 16 figs. Nature and quality of limes and cements; proportion of constituents of mortars and concretes by volume; compression tests; etc.

Elasticity and Strength of Masonry. Tests on Pressure Elasticity and Compressive Strength of Masonry, Especially for the Determination of the Influence of Different Mortars on the Pressure Elasticity of Concrete and Brick Masonry (Versuche über die Druckelastizität und Druckfestigkeit von Mauerwerk, etc.), O. Graf. Beton u. Eisen, vol. 23, nos. 5 and 6, Mar. 5 and 20, 1924, pp. 52-58 and 65-68, 19 figs. Account and results of tests to obtain information on elasticity and strength of masonry of different mortars and different brickwork.

Lime. Hardening Process of Lime Mortars, J. E. Duchez. Rock Products, vol. 27, no. 18, Sept. 6, 1924, pp. 62-63. Discusses chemistry of addition of aluminates to lime to give mortars quick-setting and hydraulic properties.

MOTION PICTURES

Cameras. Kinematics, A. W. Judge. Automobile Engr., vol. 14, no. 193, Sept. 1924, pp. 265-270, 16 figs. Gives analysis of complex rapid mechanical motions; discusses high-speed cinematography, etc.

Films. Recent Progress in the Motion Picture Industry (Les progrès récents de l'industrie cinématographique), L. Lobel. Technique Moderne, vol. 16, no. 14, July 15, 1924, pp. 475-481, 28 figs. Discusses film and its support, apparatus for treating films, negatives and positives, color films and talking films.

Utilizing Technico-Scientific Films (Die Auswertung arbeitswissenschaftlicher Filme), R. Thun. Maschinenbau, vol. 3, no. 13, Apr. 10, 1924, pp. 454-458, 2 figs. Discusses method for turning to account technical films for time-study purposes.

Natural-Color. Cinematography in Natural Colours, G. A. Smith. Roy. Soc. Arts—Jl., vol. 72, no. 3717, Feb. 15, 1924, pp. 214-217 (includes discussion). Describes further developments.

Projecting Apparatus. Incandescent Lamps as a Source of Light for Projection (Die Glühlampe als Projektionslichtquelle), W. Meinel. Licht u. Lampe Rundschau, nos. 23 and 24, Nov. 7 and 20, 1924, pp. 653-657 and 689-692, 13 figs. Discusses light transmission in vertical projection; data on projector made by Osram Co., Berlin; incandescent lamps for projection work.

Talking Films. Motion Pictures with Speech (Le cinéma parlant et chantant), p. Girardin. Radioeléctricité, vol. 5, no. 67, Sept. 10, 1924, pp. 231-232, 3 figs. Describes method proposed for reproduction of speech, etc., in exact synchronism with projection of pictures in cinematograph; essential novelty of method is use of special "photion" cell, comprising two electrodes of special metal with one of rare gases filling bulb; cell is used in conjunction with hot-wire microphone to affect narrow strip at one edge of cinematograph film, thus giving series of tiny rectangles whose different shades represent sounds to which they are due.

The Talking Film (Der sprechende Film), Radicke. Deutsche Optische Wochenschrift, vol. 10, no. 7, Feb. 7, 1924, pp. 71-73, 5 figs. Details of system and apparatus developed by Vogt, Massolle, and Engel, by use of which picture and speech can be reproduced, fully synchronized, in film.

MOTION STUDY

Applications. See INDUSTRIAL MANAGEMENT, Elements of Work, Classification of.

Naval Gunnery, Application to. The Application of Motion Study to Naval Gunnery, J. G. Gross. U. S. Nav. Inst.—Proc., vol. 50, no. 262, Dec. 1924, pp. 1998-2009, 2 figs. Definition of motion study based on extracts from publications by Frank B. and Lillian M. Gilbreth; its application in naval service; examples of instruction cards used on board U.S.S. Smith Thompson.

MOTOR BOATS

All-Metal. The Application of Experiences of German All-Metal Airplane Construction on Boat

and Automobile Construction (Die Anwendung der Erfahrungen des deutschen Ganzmetallflugzeugbaues auf den Boots- und Karosseriebau), G. Reinhard. Motorwagen, vol. 27, no. 1, Jan. 10, 1924, pp. 7-9, 4 figs. Describes various types of all-metal motor boats of German design and advantages of such construction.

Engines. Engines for Motorboats, Geo. F. Crouch. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 117-119. Discusses remote control of spark, throttle, and reverse gear, and suggests improvements; minor details relating to reliable and compact installation; deals mainly with high-powered cruisers and to boats of runabout type.

Lifeboats. Solve Unusual Lifeboat Problem. Mar. Rev., vol. 54, no. 9, Sept. 1924, pp. 349-352, 5 figs. Engineers meet need for lifeboat capacity for 1500 persons on 300-ft. ship.

MOTOR BUSES

Axle Housings, Machining. See AUTOMOBILES, Axle Housings.

Berlin. Bus Traffic in Large Cities, With Particular Reference to Berlin (Der Kraftomnibus im Grossstadtverkehr. Erläutert an den Berliner Verkehrsverhältnissen), E. Giese. Verkehrstechnik, vol. 41, no. 46, Nov. 14, 1924, pp. 575-583, 11 figs. Historical development; motor bus as compared to street railway; improvements of motor bus suggested; congestion in large cities can be overcome only by construction of subways and by opening of new streets.

Bodies. Developments in Motorbus-Body Design, H. G. Bersie. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 346-351 and 358, 13 figs. Discussion of subject from viewpoint of passenger, as motor bus approaches him, as he enters it, and as he judges quality of transportation it affords.

Coördination with Electric Railways. See ELECTRIC RAILWAYS, Coördination with Motor-Bus Transportation.

Design. European Motor Bus Design. Elec. Ry. Jl., vol. 64, no. 12, Sept. 20, 1924, pp. 448-452, 13 figs. Double-deck design coming in use more and more; effort being made to inclose upper deck for all weather; light wood bodies used; weight limitation imposed by Dept. of Police.

Future Problems of Motorbus Engineering; A. F. Masury. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 426-430, 9 figs. The six-wheel motor bus; problems of large motor-bus design; advantages of two rear axles; brakes and steering; engine and chassis; other problems.

Detachable Tractor. Front Wheel Drive Chassis Without Axles Is Developed for Bus Purposes. Automotive Industries, vol. 51, no. 16, Oct. 16, 1924, pp. 678-680, 4 figs. Complete power plant, driving mechanism and most of braking system form detachable tractor unit in chassis of Uppercu coach designed and built by Aeromarine Plane & Engine Co., Keyport, N. J.; trailer unit which carries body, has very low stiff straight top frame and wheels mounted on radius arms.

Double-Deck. The Double-Deck Motor Omnibus, R. W. Meade. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 209-216. London's experience with early motor buses; London motor-bus specifications, and post-war development; double-deck buses on European continent; early bus operation in New York City; expansion to other cities and improvements in equipment; controlling factors for future design.

Electric-Railway Operated. Extent and Kind of Bus Operation by Electric Railways. Elec. Ry. Jl., vol. 63, no. 1, Jan. 5, 1924, pp. 5-13. Summary of methods of 121 companies based on nation-wide survey of industry; feeder service is most common form of operation; great expansion planned for 1924.

Engines. Accessibility with Complete Enclosure Combined in New Wisconsin Bus Engine, W. L. Carver. Automotive Industries, vol. 51, no. 26, Dec. 25, 1924, pp. 1080-1081, 2 figs. Pushrod tappets are mounted in die-cast carriers which are integral with housing covers; valves are seated in top of machined combustion space; torque curve peaks at 650 r.p.m.

Continental Announces Special Engine for Express Bus Service. Automotive Industries, vol. 50, no. 20, May 15, 1924, pp. 1075-1076, 2 figs. 6-cylinder engine has piston displacement of 331 cu. in. and develops maximum of over 70 hp. at 2300 r.p.m.; built for rapid, inter-city passenger work with long, non-stop runs.

New Budá Six Cylinder Engine Designed Especially for Bus Service, D. Blanchard. Automotive Industries, vol. 51, no. 23, Dec. 4, 1924, pp. 955-956, 1 fig. Aluminum crankcase extends some distance below crankshaft axis for increased rigidity; special attention given to balancing of moving parts; both crankshaft and camshaft have four bearings.

100-Hp. Knight Six Designed Specially for Large High Speed Buses, B. M. Ikert. Automotive Industries, vol. 51, no. 14, Oct. 2, 1924, pp. 596-599, 11 figs. Describes new product of Yellow Sleeve Valve Engine Works, Inc., East Moline, Ill., designed specially to meet requirements of service in heavy motor coaches where rapid acceleration, high speed, quiet operation, high fuel economy, low oil consumption, minimum vibration and low maintenance costs are controlling factors.

Rigid, Deep Section Aluminum Crankcase Feature of New Waukesha Bus Engine, W. L. Carver. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, pp. 854-855, 2 figs. Latest six develops 103 b.hp. at 2000 r.p.m.; cylinders are cast in pairs and lower portion is oil cooled; tapped carriers are mounted inside case.

The Practical Engine for Public Automobile Transportation (Le moteur pratique des Transports publics automobiles), M. Bonhomme. Industrie des Tramways, vol. 18, no. 215, Nov. 1924, pp. 477-485, 3 figs. Report presented to Int. Congress in Paris, covering general characteristics of engines employed in industrial vehicles, principal desiderata of engines for industrial vehicles, fuels, special motors for heavy oils, future of explosion engine, and electric vehicles.

Field and Future. The Field and Future of the Motorbus, J. A. Emery. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 107-110. Relation of buses to railroads on routes not served by railroads, as adjunct to railways; substitute for unprofitable railway lines.

Fire Extinguishers. Fire Extinguishers. Motor Transport (Lond.), vol. 39, no. 1022, Sept. 29, 1924, pp. 380-381, 1 fig. Details of requirements for fire extinguishers on public service passenger cars in Metropolitan area (London).

Gasoline-Electric. Gas-Electric Bus Proves Its Worth in 10,000 Mile Test. Automotive Industries, vol. 51, no. 4, July 24, 1924, pp. 195-197, 4 figs. Describes gas-electric bus with Arendt-Morton system of control and propulsion, built by Gen. Elec. Co. and Atlas Truck Corpn. and in service on a cross-town line in New York City. Small engine in conjunction with electric power furnishes rapid acceleration and consistent service. Carries 35 to 45 passengers.

Gear-Shifting Mechanism. Novel Gear Shifting Mechanism Chief Feature of German Bus, B. R. Dierfeld. Automotive Industries, vol. 50, no. 10, Mar. 6, 1924, pp. 575-576, 5 figs. New Kastner

gate change incorporates original design; special method used for locking shifter bars has merit of compactness and simplicity; device evolved to prevent swaying of rear end; front-axle steering pivot operates constantly in bath of oil; chassis is brought out by Mannesmann-Mulag Co., Aix-la-Chapelle.

Graham. Graham Brothers Introduce One-Ton Truck and Two New Bus Chassis, D. Blanchard. Automotive Industries, vol. 51, no. 18, Oct. 30, 1924, pp. 772-773, 2 figs. Latter are similar to 1½-ton model and have 140 and 158-in. wheelbase; sedan and pay-enter type bodies seat 13 to 20 passengers; brakes have interchangeable connections.

Hydraulic Transmission. Hydraulic Transmission for Omnibuses. Engineer, vol. 137, no. 3559, Mar. 1924, p. 292, 1 fig. New system of hydraulic transmission gear which is development of mechanism, devised by same inventor for locomotive work, but modified to suit exigencies of chassis on which it has been fitted.

International Harvester Co. International Bus Has Four-Wheel Air-Operated Brakes. Automotive Industries, vol. 50, no. 23, June 5, 1924, pp. 1216-1217, 2 figs. Chassis adapted for 30-passenger bodies, is furnished in three different gear ratios, and has ball-bearing removable cylinder sleeve engine and internal-gear final drive.

Lighting. Lighting the Motorbus, W. C. Brown. Soc. Automotive Engrs.—Jl., vol. 15, no. 3, Sept. 1924, pp. 259-264, 8 figs. General conditions that affect attainment of adequate lighting; available types of bus-lighting equipment are analyzed as to their suitability; "glare" is defined and means of obviating it suggested; essentials for headlamps; tail-lamps, stop and direction signals, step-lamps, trouble-lamps, lights for signs and marker-lights discussed; most suitable type of electrical wiring needed to minimize voltage-drop, switches, lamp sockets, fuses, generator, and voltage regulator.

London General Omnibus Co. Worm Driven Cranked Axle Is Novel Feature of Latest L. G. O. Bus, M. W. Bourdon. Automotive Industries, vol. 50, no. 4, Jan. 24, 1924, pp. 184-188, 5 figs. Final reduction by internal gear and pinion running in oil; pressed steel frame has one pronounced drop back of engine and another aft of rear axle; rubber buffers used to supplement springs.

New York City. Coach and Bus Operation in New York, J. A. Beeler. Elec. Ry. Jl., vol. 64, no. 6, Aug. 9, 1924, pp. 195-198, 4 figs. Details of Fifth Ave. and municipal lines; difference in service and buses; bus situation in Manhattan and Bronx.

Operation and Maintenance. The Operation and Maintenance of the Motorbus, J. B. Stewart, Jr. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 311-316, 1 fig. Discusses use in intercity service, selection of motor bus or motor coach, brake rigging, repairs and replacements, use of anti-skid devices, reinforced cross-links, overcoming disadvantages of pit, and ventilation.

Public-Utility Operation. Public-Utility Experience with the Motorcoach, V. E. Keenan. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 320-323, 6 figs. Experience of United Elec. Rys. Co., Providence, Ohio. About 16 per cent of electric-railway mileage in Providence to be abandoned because it does not pay cost of electric operation. Comparison of earning power of motor bus and street-railway car.

Reading, England. Municipal Motor'Bus Services and Building Development. Motor Transport (Lond.), vol. 39, no. 1010, July 7, 1924, pp. 15-16, 3 figs. When first introduced into Reading buses were regarded only as temporary system, but they promise to become permanent.

Removable-Top. New Bus with Removable Top is Installed by Fifth Ave. Coach Co. Automotive Industries, vol. 50, no. 11, Mar. 13, 1924, pp. 614-615, 4 figs. Novel covering protects passengers from rain and snow but can be rolled up in fair weather; front and rear are inclosed in glass panels; capacity increased by lengthening upper deck.

Reo. Six-Cylinder Engine and Four-Wheel Brakes Feature New Reo Bus. Automotive Industries, vol. 50, no. 9, Feb. 28, 1924, pp. 499-501, 4 figs. Power unit and gearset mounted in sub-frame in fashion similar to passenger car of same make; body seats 21.

Republic. A New Republic Chassis. Motor Transport (Lond.), vol. 39, no. 1022, Sept. 29, 1924, pp. 377-379, 10 figs. Particulars of a machine recently imported by Republic Motor Trucks, Sales & Service, Ltd., Lond., specially designed for passenger traffic. Is intended for an open or closed body seating 24 passengers.

Self-Charging. Self-Charging Principle Applied on 25-Passenger Bus. Bus Transportation, vol. 3, no. 3, Mar. 1924, pp. 109-112, 7 figs. Details of new bus in operation on 96th St. line, New York City; storage battery acts as a power reservoir; keeps engine-generator set working at constant output; combination permits use of a 20-hp. gasoline engine.

Six-Wheel. New Six-Wheel, Double-Deck Bus Brakes on All Wheels. Automotive Industries, vol. 51, no. 14, Oct. 2, 1924, pp. 613-614, 6 figs. Brief description of latest product of Moreland Motor Truck Co. of Los Angeles, Cal. Seats 60; air-operated Lockhead hydraulic brakes.

Six-Wheel Bus, Marketed by New Concern, Has Novel Features, H. Chase. Automotive Industries, vol. 51, no. 2, July 10, 1924, pp. 97-100, 9 figs. Particulars of new bus recently announced by a new concern to be known as Six-Wheel Co. of Philadelphia. Easy riding qualities and design which permits all important units to be detached quickly and replaced by spares. Frame of massive and rigid construction. Six-cylinder Continental engine is mounted on rubber blocks.

Specifications. American Gasoline Motor Bus Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 420-421. Table of statistics.

32-Volt Systems for. Higher Voltage Systems Suggested for Heavy-Duty Motor Buses, A. M. Dudley and W. E. Menzies. Bus Transportation, vol. 3, no. 4, Apr. 1924, pp. 169-171. Arguments advanced in favor of making 32 volts standard for electrical systems on buses capable of carrying 50 to 60 passengers.

Trolley. Railless Traction (Die schienenlosen Bahnen), E. Kurzel-Runtscheiner. Zeit. des Osterr. Ingenieur- u. Architekten-Vereines, vol. 76, nos. 29-30 and 31-32, July 25 and Aug. 8, 1924, pp. 259-264 and 276-279, 6 figs. Discusses first developments and failures in 1885; direct current traction in Germany, France, England, Austria, Italy, trolley bus in America, and auto-trolleybus in Paris; alternating-current traction in Austria; etc. Bibliography.

Types. Discussion of Papers at the 1924 Annual Meeting. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 163-174, 4 figs. Discussions of papers on Field and Future of Motorbus, J. A. Emery; Double-Deck Motor Omnibus, R. W. Meade; and Essentials of Successful Constant-Compression Engine, C. E. Sargent.

MOTOR-GENERATORS

Arc-Welding. The Selection of a Single-Operator Arc-Welding Motor-Generator Set, M.

S. Hancock. Elec. Jl., vol. 21, no. 6, June 1924, pp. 269-272, 2 figs. Points that should be considered by purchaser in selection.

MOTOR PLOWS

Germany. Motor Plows at the Exposition of the German Agricultural Society of Hamburg (Die Motorpflüge auf der Wanderausstellung der Deutschen Landwirtschafts-Gesellschaft zu Hamburg), M. Dörffel. Automobil-Rundschau, vol. 23, nos. 7, 8, and 9, July 1, Aug. 1, and Sept. 1, 1924, pp. 87-91, 103-107, and 117-120, 32 figs. Design and construction of numerous types of plows, tractors, etc., including Fordson, Hansa, Pöhl, Stoever, Neumeger, Daimler, Lanz, Büssing, Stock, Cerva, Akra, M. A. N., Flader, Körting, etc.

MOTOR-TRUCK TRANSPORTATION

Central Stations. See CENTRAL STATIONS, Motor-Truck Transportation.

Coördination of Railroad and. The Coordination of Railroad and Motor-Truck Transportation, Rob. C. Wright. Soc. Automotive Engrs.—Jl., vol. 14, no. 3, Mar. 1924, pp. 302-304. As result of study, Pa. R. R. system has become convinced that motor truck can coöperate with steam railroad in three lines of activity: (1) in substituting motor trucks for rail transportation for handling short-haul less-than-carload traffic, (2) in motorizing terminals and (3) in door-to-door delivery service; advantages of motor truck in handling short-haul less-than-carload traffic; conclusions drawn.

Cost Calculation. Cost of Motor-Truck Transportation in Public Works (Coût des transports par camions automobiles dans les travaux publics), A. Mettler. Société des Ingenieurs civils Mémoires et Compte Rendu des Travaux, vol. 76, no. 10-12, Oct.-Dec. 1923, pp. 1138-1144, 2 figs. Develops formula and chart for calculating cost of transportation of cubic meter of material for a given distance.

Demountable Containers. See FREIGHT HANDLING, Containers, Demountable.

Electric. See CENTRAL STATIONS, Electric Trucks.

Freight Traffic. Utilizing the Motor Truck in Freight Traffic. Ry. Age, vol. 76, no. 5, Feb. 2, 1924, pp. 319-323, 7 figs. Contains following articles: Pennsylvania Installs 204 Miles of Motor Truck Service During 1923, R. S. Hurd; and English Store Door Delivery Practice, F. C. Horner.

Milk. Transportation of Milk by Motor Truck, H. R. Trumbower. Public Roads, vol. 5, no. 5, July 1924, pp. 1-18, 11 figs. Results of survey of milk transportation for eight large cities.

Tractor-Trailer Unit Operation. Tractor-Trailer Units in Operation, W. F. Bradley. Motor Transport (Lond.), vol. 39, no. 1015, Aug. 11, 1924, pp. 169-171, 6 figs. Work of large standardized fleet of Chenard-Walcker tractors and trailers employed by Paris firm with 180 retail shops.

MOTOR TRUCKS

Auxiliaries. Trucks, Truck Bodies, and Transportation, M. W. Potts. Indus. Mgmt. (N. Y.), vol. 67, no. 3, Mar. 1924, pp. 151-160, 12 figs. Auxiliaries that make motor truck important link in national transportation system of United States.

Axles. Building the Housings for the Sheldon Truck Axle, Fred H. Colvin. Am. Mach., vol. 59, no. 20, Nov. 15, 1923, pp. 715-718, 10 figs., and vol. 60, no. 2, Jan. 10, 1924, pp. 45-47, 8 figs. Sequence of operations and methods used in making heavy-duty axles. Nov. 15: Machines, fixtures, tools, and inspection practice. Jan. 10: Machining worm drive carrier.

Machining Sheldon Truck Axles, F. H. Colvin. Am. Mach., vol. 60, no. 8, Feb. 21, 1924, pp. 275-277, 8 figs. Some of the special machines and fixtures used in machining both front and rear axles by Sheldon Axle & Spring Co., Wilkes-Barre, Pa.

Ball-and-Socket Joints. See JOINTS, Balls and Sockets for. Machinery.

Brakes. Air Brake for Motor-Truck Trains (Die Druckluftbremse für Lastkraftzüge), T. Kollinek. Motorwagen, vol. 27, no. 18, June 30, 1924, pp. 316-318, 3 figs. Design and construction of Knorr air brake for heavily loaded trucks and trailers, acting on every wheel of train.

Convertible-Body. Originality in Convertible Bodywork. Motor Transport (Lond.), vol. 39, no. 1019, Sept. 8, 1924, pp. 301-302, 4 figs. New Republic vehicle converted from 14-seated bus to 25-30 cwt. van, requiring no lifting apparatus; power plant consists of Lycoming C.T. four-cylinder monobloc engine with detachable head, bore 3¾ in., length of stroke 5 in.

Crossley-Kégresse. Another Kégresse Track Application. Motor Transport (Lond.), vol. 39, no. 1024, Oct. 13, 1924, p. 450, 2 figs. Particulars of vehicle consisting of a 40-45-hp. Crossley chassis having a Kégresse attachment installed in place of usual rear axle and wheels; gross load capacity 2½ tons. Officially tested at Aldershot, Eng., by army authorities.

Electric. American Electric Truck Specifications. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, pp. 418-419. Specifications of different makes.

General Design and Urban Performance of Electric Trucks, J. G. Carroll. Soc. Automotive Engrs.—Jl., vol. 14, no. 1, Jan. 1924, pp. 23-29 and (discussion) 29-30 and 35, 12 figs. Considerations that influence design and location of motors and various methods by which their control is effected; details of construction and factors that determine selection of best type of drive; examination of requirements of delivery systems operating over city routes shows that electric truck is capable of meeting practically all demands of mileage, topographical conditions and speed; points out its advantages.

Why American Railway Express Uses 1,800 Electric Trucks, Rob. E. M. Cowie. Elec. World, vol. 83, no. 21, May 24, 1924, pp. 1084-1085. Definite reasons for adoption of electric transportation; fifteen specific advantages of electric truck as compared with gasoline and other types of vehicles are enumerated. (Abstract.) Address delivered before Nat. Elec. Light Assn.

Electric, Motors for. See ELECTRIC MOTORS, D.C., Electric Trucks.

Engines. A Solid Fuel Engine. Motor Transport (Lond.), vol. 38, no. 991, Feb. 25, 1924, pp. 219-220, 5 figs. Engine based on principle of injection of compressed air into solid fuel dust when in a glowing state, invented by A. Schnuerle; application to 4- and 2-cycle principle; applicable for truck or tractor work.

Fleet-Operating Costs. An Analysis of Costs for 10 Years of Fleet Operation, R. E. Plimpton. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 539-544, 7 figs. and (discussion) vol. 15, no. 3, Sept. 1924, pp. 206-210. Discusses operating costs and their relation to age of vehicle. Comparison of costs.

French Types. Passenger Car Features Incorporated into French Commercial Vehicles, W. F. Bradley. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, pp. 842-844, 6 figs. Unification of design by individual makers is feature of Paris

truck show; Citroen creeper-track machine; Latil four-wheel-drive tractor.

Gas Producers for. Most Recent Application of Transportable Gas Producers (Les dernières applications des gazogènes transportables), C. Mathieu. Industrie des Tramways Chemins de Fer et Transports Publics Automobiles, vol. 18, no. 210, June 1924, pp. 197-209, 18 figs. Review of latest types of gas producers for traction by road or rail.

Producer Gas as Motor-Truck Fuel, E. Weiss. Mech. Eng., vol. 46, no. 12, Dec. 1924, p. 902, 1 fig. Describes Etia gas producer, which operates on charcoal with steam injection; and Renault unit, consisting of furnace, gas suction chamber, and fuel reservoir. (Abstract.) Translated from Nature (Paris), no. 2635, Oct. 4, 1924, p. 214.

German. A New Special Motor Truck with Oil Transmission Gear, Front-Wheel Drive and Four-Wheel Brake (Der neue Spezial-Lastwagen mit Oeldruckschaltung, Vorderradantrieb und Vierradbremse), F. Klinkenberg. Motorwagen, vol. 27, no. 9, Mar. 31, 1924, pp. 143-148, 7 figs. Details of L. W. D. 3-ton truck, and advantages.

A New Type of Motor Truck (Eine neue Lastkraftwagen-Konstruktion). Wirtschaftsmotor, vol. 6, no. 4, Apr. 25, 1924, pp. 5-8, 6 figs. Details of L. W. D. 3-ton truck.

German Show. Motor Trucks at the Berlin Automobile Show (Die Lastkraftwagen auf der Berliner Automobilausstellung). Allgemeine Automobil-Zeitung, vol. 25, nos. 50 and 50a, Dec. 12 and 15, 1924, pp. 51-52 and 40-43, 3 figs. Review of exhibits.

Glasgow Show. The Scottish Show Reviewed. Motor Transport (Lond.), vol. 38, no. 988, Feb. 4, 1924, pp. 137-140, 17 figs. Notes on representative display of British and imported heavy vehicles, including light vans.

Guy Subsidy. The Latest Subsidy Chassis Model. Motor Transport (Lond.), vol. 38, no. 997, Apr. 7, 1924, pp. 419-421, 9 figs. Particulars of new 30-cwt. Guy designed to meet War Office requirements; 25.6-hp. 4-cylinder engine.

Krupp. Krupp Rapid Motor Truck (Krupp-Schnellastwagen), G. Hagelloch. Kruppsche Monatshefte, vol. 5, Dec. 1924, pp. 270-272, 4 figs. Design and construction of light truck for loads of 1½ to 2 tons and 16-40 hp., with maximum speed of 50 km.; 4-cylinder block engine, 90 mm. cylinder diameter and 160 mm. stroke.

Light-Delivery. Special Design Features Are Incorporated in Federal Light Delivery Truck. Automotive Industries, vol. 50, no. 15, Apr. 10, 1924, pp. 816-818, 5 figs. Transmission is three-speed-and-reverse sliding pinion type; all four gears on secondary shaft are made in single unit mounted on stationary shaft on flexible roller bearings, equipped with Willys-Knight engine.

Lighting. Self-Contained Magneto Generator Designed for Truck and Tractor Lighting. Automotive Industries, vol. 51, no. 12, Sept. 18, 1924, pp. 529-530, 3 figs. Describes electric generator brought out by Harris Elec. Co. of San Francisco, Cal. Less than 0.5 volt and less than 0.3 ampere shown as a difference in output at engine speeds from 800 to 3000 r.p.m. Lubrication effected from oiling system of engine.

Loading and Unloading Mechanism. Handling Complete Loads by Engine Power. Motor Transport (Lond.), vol. 39, no. 1023, Oct. 6, 1924, pp. 419-421, 9 figs. Particulars of a 5-ton Berna chassis equipped with Vennez-Jacquemot type A demountable body and engine-power operated mechanism for loading and unloading.

Manufacture. The Production of Heavy Commercial Motors. Machy. (Lond.), vol. 24, nos. 620 and 622, Aug. 7, 14, and 28, 1924, pp. 577-581, 609-614, and 673-677, 34 figs. Operations on Leyland lorry by Leyland Motors, Ltd., Lancashire, Eng.

See also AUTOMOBILE MANUFACTURING PLANTS, Steam Trucks.

Maudslay. A 40-50 cwt. Maudslay. Motor Transport (Lond.), vol. 38, no. 1007, June 16, 1924, pp. 741-743, 6 figs. First of a new improved model for goods or passenger transport recently completed at Coventry (Eng.) factory.

Obsolescence. When Does a Motor Truck Become Obsolete? F. W. Davis. Soc. Automotive Engrs.—Jl., vol. 15, no. 6, Dec. 1924, pp. 516-520. Discusses various factors that make for obsolescence, inadaptability, and uselessness.

Paris Shows. Paris Automobile Show, Industrial Vehicles Section, Oct. 22-31, 1924 [Le XIX^e Salon de l'Automobile, Section des véhicules industriels (22-31 octobre 1924)], G. Delanghe. Génie Civil, vol. 85, nos. 21 and 22, Nov. 22 and 29, 1924, pp. 475-480 and 489-497, 28 figs. Particulars of agricultural automobiles, motor buses, motor trucks, fire engines, and tractors exhibited.

Producer-Gas. Producer Gas for Motor Vehicles, Railway Motor Cars and Internal-Combustion Locomotives (Sauggasbetrieb für Kraftfahrzeuge, Motorwagen, Motorlokomotiven), O. Günther. Motorwagen, vol. 27, no. 35, Dec. 20, 1924, pp. 720-723, 8 figs. Discusses advantages and disadvantages of use of gas producers and describes types of gas-producer-driven vehicles.

Producer-Gas Trucks (Les camions à gaz pauvre), E. Weiss. Nature, no. 2635, Oct. 4, 1924, pp. 214-221, 13 figs. Design and construction of various types, including Vierzon, Etia, G. P. A., Lion, Renault, Berliet, etc.

The New Renault Producer, W. F. Bradley. Motor Transport (Lond.), vol. 38, no. 988, Feb. 4, 1924, pp. 127-129, 8 figs. Designed to run on wood or charcoal; claimed to show cost economy of 80 per cent; comprises fire box, aspiration chamber, and fuel tank, and is a cylindrical chamber 4 ft. 6 in. in height, with a diameter of 2 ft., bolted to left-hand frame member by side of driver's cab.

Q. M. C., U. S. A. New Q. M. C. Trucks Drive on Four or Six Wheels, H. Chase. Automotive Industries, vol. 51, no. 6, Aug. 7, 1924, pp. 271-275, 11 figs. Rear-axle brakes run in oil and have lining attached to drum. Winch, driven off secondary gear set, is located entirely below frame. Units employed include Andrade self-locking differential, Covert gear set, and Hinkley engine. Universal helps in steering.

Rehberger. Wheelbase of New Truck Can Be Varied to Meet Service Requirements. Automotive Industries, vol. 51, no. 19, Nov. 6, 1924, pp. 803-804, 7 figs. Features of 3-, 4- and 5-ton truck chassis, built by Rehberger & Son in Newark, N. J.

Saurer. Saurer 6½-Tonner Placed on American Market. Motor Transport (N. Y.), vol. 29, no. 11, Jan. 1, 1924, pp. 376-377, 2 figs. Engine brake, ball bearings on crankshaft and camshaft, cast iron brake shoes in place of lining, and bevel drive are features.

Semi-Trailer Tanker. 3,000 Gallons by Semi-Trailer. Motor Transport (Lond.), vol. 38, no. 1005, June 2, 1924, pp. 664-666, 7 figs. Frameless semi-trailer tanker introduced by Scammell Lorries, Ltd., for fuel-oil transport and with other important possibilities.

Six-Wheel. A Six-Wheel Truck with Four-Wheel Drive. West Machy. Wld., vol. 15, no. 7, July 1924, pp. 229-230 and 246, 5 figs. Describes truck designed by A. H. Lacey and C. M. Crosson; driving unit contains two spiral bevel-gear assemblies, each rigidly attached to helical-gear assembly, thus making one compact unit which is attached to main-frame cross-members;

chassis designed to cover city and interurban buses, long-distance trucking, refrigerator trucks, and all high-speed transportation.

Specifications. Current Specifications of Gasoline Trucks. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, pp. 409-414. Specifications of the different makes of trucks of from ¾ ton and under to 5 tons and over.

Specifications and Design. Recent Trends in Truck Design. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 424-439. American gasoline-truck specifications; British and Continental European truck-chassis specifications.

Steam. Six-Seven Ton Steam Wagon. Engineer, vol. 137, no. 3574, June 27, 1924, pp. 714-715, 4 figs. Details of steam truck which will be shown by John Fowler & Co., Ltd., at Royal Show at Leicester. Is of end-tipping type, designed to carry from 6 to 7 tons and haul a trailer; fitted with rubber tires; boiler is of vertical fire-tube type, devoid of stays, centrally fired, and designed for working pressure of 225 lb. per sq. in.

The Atkinson Six-Ton Steam Wagon. Automobile Engr., vol. 14, no. 196, Nov. 1924, pp. 352-361, 21 figs. Supplied with double-acting uniflow engine; boiler is of vertical type with cross water tubes.

The Fowler Steam Wagon. Engineering, vol. 118, no. 3078, Dec. 26, 1924, pp. 855-856, 3 figs. Designed to carry load of 6 to 7 tons easily up gradient of 1 in 10; boiler is built entirely without stays.

The "Sentinel" Steam Wagon. Indus. Mgmt. (Lond.), vol. 11, no. 2, Jan. 24, 1924, pp. 51-53, 4 figs. Particulars of Super-Sentinel and the various types of bodies built for different kinds of work.

Super-Speed Gear. Improvements in Motor Lorries. Eng. Progress, vol. 5, no. 12, Dec. 1924, pp. 253-254, 2 figs. Describes 3- and 5-ton trucks manufactured by Nationale Automobil Gesellschaft (N. A. G.), having cardan transmission and super-speed gear.

Testing. Modern Methods of Truck Testing, W. L. Day. Mgmt. & Administration, vol. 8, no. 3, Sept. 1924, pp. 285-287, 6 figs. Notes on new method of testing employed at plant of Gen. Motors Truck Co. and recording instruments used.

Thornycroft. A Moderate Cost 25-30-cwt. Chassis. Motor Transport (Lond.), vol. 39, no. 1018, Sept. 1, 1924, pp. 271-273, 9 figs. Details of new chassis having four cylinders combined in single casting with detachable head, and bore and stroke of 95 mm. and 127 mm., respectively.

Tipping Gears. The Latest Three-way Tipping Development. Motor Transport (Lond.), vol. 39, no. 1024, Oct. 13, 1924, pp. 443-444, 5 figs. Particulars of a modification of hand-operated three-way tipping mechanism of F. Waters & Co., Rugby, Eng., incorporating a new device for universal movement of lifting screw.

Trailers. Trailers and Demountable Bodies for Motor Transportation, H. W. Howard. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 324-328, 6 figs. Importance of lost-time factor in truck operation, and how lost-time factor can be reduced; respective merits of two- and four-wheel trailers; explains the three methods of semi-trailer hauling, using one, two, or three such vehicles behind a tractor truck, and advantages of each. Describes a motor-driven vehicle specially designed to load, haul, and unload sugarcane.

Transmissions. New Brown-Lipe Maximum Transmission Used in Standard Truck. Automotive Industries, vol. 50, no. 14, Apr. 3, 1924, p. 753, 3 figs. Seven forward and two reverse speeds make it possible to meet large range of operating conditions; constant mesh pinions are replaced by pair of sliding gears with separate control.

Trolley-Wire-Repair. New Trolley-Repair Car of Société des Transports en Commun de la Région Parisienne (Nouvelle Voiture-Echelle de la Société des Transports en Commun de la Région Parisienne), M. Gentil. Industrie des Tramways, vol. 18, no. 215, Nov. 1924, pp. 443-448, 7 figs. Design and construction of motor truck with ladder and tower, for repairing overhead trolley wires.

Two-Way Drive. New Truck Travels Forward or Backward at Equal Speeds. Automotive Industries, vol. 51, no. 20, Nov. 13, 1924, pp. 852-853, 3 figs. Transmission gear provides five gear changes; special reverse gear in rear axle makes traveling in either direction possible; two seats are provided for driver facing opposite directions; manufactured by O'Connell Motor Truck Co.

Wheels. Laboratory Strength-Tests of Motor-Truck Wheels, T. W. Greene. Soc. Automotive Engrs.—Jl., vol. 15, no. 2, Aug. 1924, pp. 150-155 and 174, 13 figs. Discusses tests of mechanical properties of six types of wheels as shown in radial compression test, skid test, elastic resiliency, also character of failures, load deflection curves for skid test, etc.

MOTORCYCLES

British Show. The Motor Cycle Show. Automobile Engr., vol. 14, no. 197, Dec. 1924, pp. 398-405, 24 figs. Points to increased popularity of 350-cc. single-cylinder machines as outstanding feature; other features of interest.

Cylinders, Casting. See CYLINDERS, Motorcycle.

Design. Lessons Which Motorcycle Industry Can Learn from Automobile Construction (Was kann der Kraftbau vom Automobilbau lernen? J. Dauben. Motorwagen, vol. 27, no. 34, Dec. 10, 1924, pp. 667-672, 5 figs. Discusses how features in design of automobile engines, springs, transmission, lubrication, rakes, tires, etc., can be advantageously applied to design of motorcycles.

Diesel-Engined. See DIESEL ENGINES, Motorcycle.

Engine Valves. Vertical Valves or Inverted Vertical Valves for Motorcycles? (Stehende oder hängende Ventile für Krafträder?), J. Fischer. Automobil-Rundschau, vol. 23, no. 11, Nov. 1, 1924, pp. 151-155, 7 figs. Theoretical and practical considerations show that in spite of unavoidable complications advantages of inverted vertical valves outweigh disadvantages.

Gear Boxes. Machining Gear Box Components. Eng. Production, vol. 7, no. 144, Sept. 1924, pp. 273-277, 15 figs. Describes manufacturing methods of motorcycle gear boxes as produced at works of J. Jardine, Ltd., England; simple and efficient equipment for interchangeable manufacture.

German. German Motorcycles (Das deutsche Motorrad). Allgemeine Automobil-Zeitung, vol. 25, no. 20, May 17, 1924, pp. 27-38, 28 figs. Review of present status of development; description of German types arranged alphabetically according to their makers.

German Show. Motorcycles at the Berlin Automobile Show (Die Motorräder auf der Berliner Automobilausstellung). Allgemeine Automobil-Zeitung, vol. 25, no. 51, Dec. 17, 1924, pp. 39-43, 15 figs. Review of exhibits and improvements.

Horizontal-Frame. The Ner-a-car. Automobile Engr., vol. 14, no. 186, Feb. 1924, pp. 32-38, 12 figs. Describes motorcycle of unconventional design; main departure is use of horizontal frame in place of usual vertical diamond frame which has considerably simplified mounting for engine, transmission, and other accessories; two-stroke

engine is employed, fitted with combined flywheel magneto.

Specifications. American Motorcycle Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 451-453. Tabular data.

Types. International Motorcycle Show in Stuttgart (Germany) (Internationale Motorradausstellung in Stuttgart). Allgemeine Automobil-Zeitung, vol. 25, no. 21, May 24, 1924, pp. 19-21, 21 figs. Description of exhibits.

MOTORSHIPS

Air Compressors for. See AIR COMPRESSORS, Motorships.

Auxiliaries, Drive for. See STEAM TURBINES, Steam-Air Drive.

Cargo. A New Motor Grain-Carrying Ship. Mar. Engr. & Motorship Bldr., vol. 47, no. 567, Dec. 1924, pp. 441-448, 21 figs. Particulars of machinery space of the Silurian, built by Blythswood Shipbldg. Co., Ltd., Scotstoun, and engined by Wm. Beardmore & Co., Ltd., Dalmuir, for Owen & Watkin Williams, Ltd., Cardiff. Length b.p., 435 ft.; breadth, molded, 57 ft.; depth, molded, 33 ft. 3 in.; deadweight capacity, 11,000 tons.

A New Motor Ship for Tropical Coastal Service. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, pp. 98-103, 11 figs. Particulars of the Kistna, built for British Indian Steam Navigation Co., Ltd.; a 6-cylinder Neptpune oil engine of 100 b.hp. at 125 r.p.m.; length, overall, 287 ft.; breadth, molded, 39 ft. 9 in.; depth, 24 ft.; gross tonnage, 2300 tons; deadweight capacity, 1650 tons.

First American Freighter with Opposed-Piston Oil Engines. Motorship, vol. 9, no. 2, Feb. 1924, pp. 88-94, 17 figs. Converted steamer Challenger runs trials with her new Sun-Doxford Diesel engine.

First Cargo Vessel with Beardmore-Speedwell Oil Engines. Mar. Engr. & Nav. Architect, vol. 47, no. 557, Feb. 1924, pp. 46-47, 4 figs. partly on p. 52. Motorship Margretian, built by Chas. Hill & Sons, Bristol, and engined by Wm. Beardmore & Co., has deadweight capacity of 4700 tons.

First Great Lakes Freighters Fitted with Diesel Engines. Mar. Engr. & Motorship Bldr., vol. 47, no. 567, Dec. 1924, pp. 455-457, 4 figs. Particulars of Henry Ford II, built by Am. Shipbldg. Co., Lorain, Ohio, and engined with Sun-Doxford opposed-piston Diesel engines. Length, overall, 611 ft.; breadth, molded, 62 ft.; depth, molded, 32 ft.

From Geared Turbine Steamer to Motorship. Shipbldg. & Shipg. Rec., vol. 24, no. 21, Nov. 20, 1924, pp. 606-608, 4 figs. Particulars of cargo ship of three-island type, owned by Stoomvaart My. Rotterdam, originally named Turbinia and renamed Wieringen, which has been converted from single-reduction geared turbine drive to Diesel-engine drive.

Machinery of the Converted Motorship Challenger. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 155-158, 11 figs. Describes machinery of American vessel converted from steam to Diesel drive, formerly a Shipping Board cargo steamer of approximately 11,600 deadweight. Main engine is a 2-cycle opposed-piston Diesel of Doxford type; Worthington auxiliaries and Westinghouse motors.

Motorship "Nordhval." Shipbldg. & Shipg. Rec., vol. 24, no. 8, Aug. 21, 1924, pp. 222-223, 1 fig. Describes motorship, sister ship to "Nordbo," built by Burmeister & Wain, Copenhagen. Length between perpendiculars, 380 ft.; breadth, molded, 53 ft. 6 in.; depth, 36 ft.; machinery, two Burmeister & Wain 6-cylinder, 4-cycle, short stroke marine Diesel engines; indicated horsepower, 2600.

M. S. Swanley Equipped with North British Engine. Mar. Eng. & Shipg. Age, vol. 29, no. 9, Sept. 1924, pp. 524-526, 6 figs. First British-built ship to be equipped with double-acting two-cycle engine; length, 410 ft.; beam, 55 ft. 3 in.; depth, 29 ft.; draft, 25 ft. 7 in.; break horsepower, 1850; speed 10 knots.

"Silverhelm" Has New Model Opposed-Piston Engine. Motorship, vol. 9, no. 7, July 1924, pp. 511-513, 6 figs. Only 3 cylinders are used and scavenging pump is driven off beam; engine room is short, although 2 auxiliary boilers are placed in it; purifiers and pyrometer enhance good running. Propelling power furnished by Doxford 3-cylinder 6-piston 2-cycle engine developing 1850 b.hp. at 52 r.p.m.

Single-Screw Motor Freighter "Fernbank" (Einschrauben-Motorfrachtschiff "Fernbank"). Schiffbau, vol. 25, no. 28, Nov. 19, 1924, pp. 789-797, 19 figs. partly on supp. plates. Details of design, construction and equipment. Length, 121 m.; draft, 7.7 m.; displacement, 11,165 tons; six-cylinder, DW-AEG oil engines of 115 r.p.m., 2800 i.hp.

The Diesel-electric Fruit-carrying Ships "La Playa," "La Marea" and "La Perla." Shipbldr., vol. 40, no. 161, Jan. 1924, pp. 29-44, 15 figs., partly on supp. plate. See also Mar. Eng. & Shipg. Age, vol. 29, no. 1, Jan. 1924, pp. 20-24, 6 figs. Built by Cammell, Laird & Co., Birkenhead; general arrangement and equipment; propelling machinery consists of four generating sets, each unit consisting of 4-cylinder Camellaird-Fullagar Diesel engine designed to develop 825 b.hp. at 250 r.p.m.

The Diesel-electric Ship "La Playa," T. H. Relton. Gen. Elec. Rev., vol. 27, no. 9, Sept. 1924, pp. 634-639, 7 figs. Description of propelling machinery and electrical control equipment and operation of fruit carrier of United Fruit Co.

The First Motorship for the Donaldson Line. Shipbldg. & Shipg. Rec., vol. 24, no. 16, Oct. 16, 1924, pp. 455-461, 6 figs. Details of single-screw vessel designed for carrying of general cargo, cattle, and also having considerable refrigerated space for transport of frozen meat. Vickers 8-cylinder 4-stroke cycle solid-injection Diesel engine of 2700 b.hp. Length, overall, 398 ft.; breadth, molded, 51 ft. 6 in.; depth to upper deck, 39 ft.; gross tonnage, 5200 tons; deadweight, about 7500 tons.

The First Ships with Neptune "B" Type Engines. Mar. Engr. & Motorship Bldr., vol. 47, no. 561, June 1924, pp. 219-226, 13 figs. Particulars of M. S. "Iossifoglu" and M. S. "Silverpine," built and engined by Swan, Hunter & Wigham Richardson, Ltd. Single sets of 2-stroke Neptune Diesel engines and steam auxiliaries.

The Twin-screw Motor-driven Cargo Ship "Dolius." Shipbuilder, vol. 30, no. 166, June 1924, pp. 467-477, 10 figs. Particulars of vessel built by Scotts' Shipbldg. & Eng. Co., Ltd., of Greenock, for Alfred Holt & Co., of Liverpool. Main engines consist of two 4-cylinder sets driving twin screws and designed for a combined output on service of 2500 b.hp. at about 120 r.p.m.; length, overall, 423 ft.; breadth, molded, 52 ft.; depth, molded, 32 ft.; load, deadweight, about 8000 tons.

The Twin-Screw Motor Ship "Sycamore." Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, pp. 87-94 and 103, 14 figs. Description of new Furness Withy cargo vessel; propelling machinery, 2 sets 6-cylinder Richardsons-Westgarth-Tosi marine Diesel engines, each developing 1250 b.hp. at 125 r.p.m.; length between perpendiculars, 364 ft.; breadth, molded, 52 ft. 2½ in.; depth, molded, 26 ft. 11 in.; deadweight capacity, 6000 tons.

Trials and Operation of the Motor Ship Cubore,

A. B. Homer. Soc. Nav. Architects & Mar. Engrs.—Advance Paper no. 10, for meeting Nov. 13-14, 1924, 7 pp., 2 figs. See (abstract) in Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 735-737. Description of ship and data on operation of vessel owned and operated by Ore S. S. Corpn. of N. Y.

Trials of the Motor Ship Sycamore. Inst. Mech. Engrs.—Proc., no. 5, 1924, pp. 863-985, 46 figs. See also Engineering, vol. 128, nos. 3074 and 3075, Nov. 28 and Dec. 5, 1924, pp. 750-753 and 784-786, 42 figs.; and Engineer, no. 3596, Nov. 28, 1924, pp. 618-620, 4 figs. Tests carried out by Marine Oil Engine Trials Committee on vessel equipped with two 2500-s.hp. oil engines of Richardsons-Beardmore-Tosi director valve type; shore test results and sea trials. Includes description of distant-indicating torsionmeter.

See also Passenger-Cargo.

Clutches. The Föttinger Clutches of the Motor-Ship "Vulcan." Engineering, vol. 138, no. 3063, Sept. 12, 1924, p. 369, 2 figs. Further information as to efficiency of oil-filled Föttinger clutches of motorship built by Vulcan Werke of Hamburg and Stettin.

Coastwise, Oil-Engine Application to. Coastwise Ships, Diesel Power and Propeller Speed, S. E. Slocum. Motorship, vol. 9, no. 10, Oct. 1924, pp. 739-741, 3 figs. Makes a strong case for use of moderate speed oil engine on basis that no arbitrary figure for rotative speed but rather a coördination in design of hulls, engines, and propellers is real secret of obtaining high efficiency.

Conversion of Steamships to. Problems in Connection with Conversion of the Hog Island Steamer Seekonk to a Motor Ship, J. C. Shaw. Soc. Nav. Architects & Mar. Engrs.—Advance Paper no. 11, for meeting Nov. 13-14, 1924, 6 pp., 12 figs. See (abstract) in Mar. News, vol. 11, no. 7, Dec. 1924, pp. 134-136; also Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 737-739. Reasons for selection of hull; old and new propelling machinery; auxiliaries; shafting and propeller changes; deck machinery; reconditioning and modifications to hull; results obtained with Seekonk in service; comparison with steamers.

Design and Operating Experiences. Twelve Years of Motorship Navigation (12 Jahre Grossmotorschiffahrt), A. Carstensen. Schiffbau, vol. 25, nos. 13 and 14, Apr. 9 and 23, 1924, pp. 332-337 and 365-370, 2 figs. Notes and comparisons based on author's trips on motorship Christian X, built in 1912 by Burmeister & Wain, Kopenhagen, and on different motorships since war, built by Deutscher Werft, Hamburg, having oil engines built by Deutscher Werft and German Gen. Elec. Co. (A. E. G.) according to design of Burmeister & Wain.

Diesel-Electric. First of the Big Transocean Motorliners. Motorship, vol. 9, no. 8, Aug. 1924, pp. 583-585, 2 figs. Union Steamship Co.'s 23,000 tons displacement ship "Aorangi" launched on Clyde; power is conservatively distributed on four screws, there being four six-cylinder 27½ in. by 39 in. Fairfield-Sulzer two-cycle Diesel engines of crosshead type, each developing 3250 s.hp. at 127 r.p.m. with piston speed of 825 ft. per min.; accommodates 970 passengers.

Diesel-Electric Lightship. Diesel-Electric Drive for Lightship. Motorship, vol. 9, no. 5, May 1924, pp. 363-364, 3 figs. New vessel Maas placed in service off Rotterdam harbor entrance.

Diesel-Engined. Diesel Hydraulic Drive. Shipbldg. & Shipping Rec., vol. 24, no. 3, July 17, 1924, pp. 78-79, 5 figs. Motorship "Vulcan," first Diesel-engined vessel to be fitted with Vulcan Föttinger reversible hydraulic transmission system, cargo vessel fitted with two engines, developing total of 620 s.hp. and speed of 9½ knots.

Electric Deck Auxiliaries. Correct Design in Electric Deck-Auxiliaries, G. E. Smith. Motorship, vol. 9, no. 2, Feb. 1924, pp. 98-107, 11 figs. Author seeks to show what is considered very best practice as to types of machinery and electrical equipment; discusses winches, steering gears, capstans, and windlasses.

History and Development. History and Development of the Internal-Combustion Engine and the Motor Ship, J. H. Narbeth. Steamship, vol. 35 and 36, nos. 415, 416, 417, 418, 419, 421, 423, 424, 425, and 426, Jan., Feb., Mar., Apr., May, July, Sept., Oct., Nov., and Dec. 1924, pp. 217-221, 249-253, 280-286, 312-313, 344-345, 10-17, 76-82, 108-113, 140-146, and 171-177, 35 figs. Jan.: General European progress up to 1920. Feb.: United States progress; notable ships. Mar.: Hot-bulb engines. Apr., May, July, Sept., Oct., Nov., and Dec.: Gas engines; gasoline and paraffin engines; Daimler's work; racing and pleasure craft developed.

Ocean-Going. The First Large French Ocean-Going Motorship. Shipbldg. & Shipg. Rec., vol. 24, no. 25, Dec. 18, 1924, pp. 718-720, 3 figs. Built by Ateliers & Chantiers de la Loire, Nantes, France, and propelled by two 4-cylinder 1700-hp. Sulzer engines.

Oil Tankers. A Motor Tanker with Four-Cycle Engines. Mar. Engr., vol. 47, no. 559, Apr. 1924, pp. 125-129, 9 figs. Particulars of main and auxiliary propelling machinery of oil tanker Wellfield, built for Field Tank Steamship Co., Ltd., Newcastle, Eng.; 7900 tons deadweight; two sets North Eastern-Werkspoor engines developing 2200 b.hp.

Diesel-Electric Tanker Added to Standard Oil Fleet. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 234-237, 15 figs. See also Nautical Gaz., vol. 106, no. 13, Mar. 29, 1924, pp. 338-339, 2 ngs. Particulars of J. H. Senior, built for Standard Oil Co. of N. J.; length, overall, 220 ft.; breadth, molded, 38 ft.; depth, molded, 16 ft. 6 in.; displacement, loaded, about 2300 tons.

Italian Motor Tanker with Fiat Engines. Mar. Engr., vol. 47, no. 566, Nov. 1924, pp. 416-417, 5 figs. Particulars of "Lanuvio," built by Ansaldo San Giorgio, Spezia, Italy, for Societa di Navigazione "Roma"; two sets 4-cylinder 2-troke cycle Fiat Diesel engines, rated at 1300 b.hp. at 630 r.p.m.; length, overall, 393 ft.; breadth, 30 ft. 3 in.; depth, molded to main deck, 30 ft.; load displacement, 11,890 tons.

Large Motor Tankers Under Construction in Europe. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 583-584, 1 fig. Details of British Aviator, built by Palmers, equipped with highest-powered Camellaird-Fullagar engine yet built; trial results.

Single-Screw Motor Tanker of 5,100 Tons D.W. Shipbldg. & Shipg. Rec., vol. 23, no. 13, Mar. 27, 1924, pp. 364-365, 2 figs. Particulars of Zoroaster, built for Rederiaktiebolaget Zoroaster, Stockholm; length, overall, 320 ft.; breadth, molded, 49 ft.; depth to main deck, 28 ft.; 4-cylinder 2-stroke Novel-Diesel engine of 2000 i.hp.

Tanker Propulsion and Diesel-Electric Drive. Motorship, vol. 9, no. 4, Apr. 1924, pp. 257-260, 4 figs. Describes how this form of propulsion in Standard Oil Co.'s new bulk-oil carrier, J. H. Senior, makes possible pilot-house control of machinery and simplifies navigation on rivers and harbors.

The Motor Oil-Tanker "Conde de Churruca." Mar. Engr. & Nav. Architect, vol. 47, no. 557, Feb. 1924, pp. 48-50, 4 figs. Operating figures of tanker which completed 102,988 mi. with average fuel consumption of 8.15 tons per day for 10.13 knots.

The Motor-Tanker Urano (Das Motortankschiff Urano), G. Wahl, V. Rembold and L. Baisch. Petroleum, vol. 20, nos. 24 and 25, Aug. 20 and

Sept. 1, 1924, pp. 1185-1193 and 1249-1256, 17 figs. Details of design and construction; built by Deutsche Werke A. G. at Kiel; speed, 10 knots at full load; length between verticals, 121 m.; four-stroke, six-cylinder Diesel engine at 950 hp. at 135 r.p.m.; auxiliary 3-cylinder Diesel engine of 180 hp. at 300 r.p.m.

The New Motor-Tanker "British Aviator." Mar. Engr. & Motorship Bldr., vol. 47, no. 564, Sept. 1924, pp. 336-346, 21 figs. Particulars of first ship fitted with six-cylinder Camellaird-Fullagar marine oil engine, built and engined by Palmers Shipbldg. & Iron Co. for British Tanker Co.; length between perpendiculars, 440 ft.; breadth, extreme, 57 ft.; depth to upper deck, 33 ft. 11 in.; gross tonnage, 6950 tons; ship develops 3000 b.hp.

Two New Motor Tankers with Werkspoor Engines. Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 245-248, 5 figs. Particulars of "Varanger" and "Nordanger," oil tankers being constructed by Netherlands Shipbldg. Co., Amsterdam, for Westfal, Larson & Co., Norway. To be engined with 4-stroke single-acting Werkspoor Diesel engine of modified type. Length, 469 ft.; breadth, molded, 60 ft.; depth, 38 ft. 6 in.; displacement, 18-135 tons.

Operating Costs. Influence of Size on Operating Expense of Motorships, L. B. Chapman. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 143-145. Gives operating cost comparison between 6 typical motorships with idea of determining a practical method for determining size of most economical ship.

Ore-Carrying. Ford's Two 611-ft. Motorships Placed in Service. Motorship, vol. 9, no. 9, Sept. 1924, pp. 652-658, 18 figs. Describes two single-screw vessels, "Benson Ford" and "Henry Ford II"; power plant consists of 3000 s.hp. four-cylinder two-cycle, opposed-piston Sun-Doxford oil engine; length, overall, 611 ft.; breadth, molded, 62 ft.; depth, 32 ft.; deck camber in 60 ft. 15 in.

Ore-Carrying Motor Ships. Shipbldg. & Shipg. Rec., vol. 23, no. 5, Jan. 31, 1924, pp. 130-134, 5 figs. Fleet of Grangesberg Oxelösund Ore Co., Stockholm; details of propelling machinery, consisting of two sets of heavy-oil engines of Burmeister & Wain type.

Passenger. First Diesel Liner on Atlantic. Mar. Rev., vol. 54, no. 3, Mar. 1924, pp. 95-96, 1 fig. Principal data and characteristics of passenger motorship Gripsholm now under construction for Swedish American line; main engines, two Burmeister & Wain double-acting 4-stroke cycle Diesel type with total b.hp. of 13,500; length, 574 ft. 6 in.; breadth, 74 ft.; depth, 76 ft.; displacement, 23,500 tons.

Launch of the Second New Orient Liner. Shipbldg. & Shipg. Rec., vol. 24, no. 8, Aug. 21, 1924, pp. 234-235, 2 figs. Describes second of new 20,000-ton lines built at John Brown & Co.'s yard at Clydebank for Orient Line; length, 657 ft. 6 in.; breadth, 75 ft.; depth to upper deck, 47 ft.; propelling machinery consists of two independent sets of Brown-Curtis turbines driving twin-screws through single-reduction helical gearing and capable of developing about 20,000 shaft hp.

World's Most Modern Passenger Liner. Pac. Mar. Rev., vol. 21, no. 9, Sept. 1924, pp. 464-466, 9 figs. Describes quadruple screw Diesel-engined 23,000 ton motorship being built by Union Steamship Co. for their Vancouver-Sydney run; length, 600 ft.; beam, 72 ft.; molded depth, 46 ft. 6 in.; loaded displacement, 23,000 tons.

Passenger-Cargo. A Burmeister & Wain Engine with Cylinder Top Camshaft. Mar. Engr. & Motorship Bldr., vol. 47, no. 561, June 1924, pp. 203-205, 5 figs. Notes regarding new single-screw passenger and cargo vessel Frem, constructed and engined by Burmeister & Wain Ltd., Copenhagen, for Bornhölm Steamship Co. for service between island of that name and Copenhagen. Propelling machinery consists of Burmeister & Wain truck piston light-type 4-stroke cycle engine developing 1150 i.hp. at from 135 to 140 r.p.m. Length, 210 ft. 6 in. breadth, molded, 35 ft.

An Interesting 17-Knot American Day Steamer. Shipbldg. & Shipg. Rec., vol. 24, no. 11, Sept. 11, 1924, pp. 312-314, 3 figs. Specifications of "Catalina" built by Los Angeles Shipbldg. & Dry Dock Corpn. for Wilmington Transportation Co.; length between perpendiculars, 285 ft.; breadth, molded to main deck, 52 ft.; depth, molded, 44 ft.; propelling machinery consists of two sets of triple-expansion engines, having cylinders 20½, 35, and 60 in. in diameter and stroke of 36 in.

Mixed Cargo and Passenger Motorships. Mar. Eng., vol. 29, no. 11, Nov. 1924, pp. 649-651, 3 figs. Particulars of Centaur, single-screw vessel built for Singapore-West Australia service of Straits Steamship Co. of Singapore, and of City of San Francisco, twin-screw vessel built for service between San Francisco and Panama.

The First French Ocean-Goin Motorship. Mar. Engr. & Motorship Bldr., vol. 47, no. 564, Sept. 1924, pp. 329-330, 3 figs. See also Shipbldg. & Shipg. Rec., vol. 24, no. 6, Aug. 7, 1924, p. 176, 1 fig. Particulars of "Camranh" constructed by Ateliers et Chantiers de la Loire and engined by Sulzer Bros. for Chargeurs Reunis; length between perpendiculars, 449.5 ft.; breadth, 59 ft.; depth, 40 ft.; draught, loaded, 29.2 ft.; propelling machinery consists of two Sulzer four-cylinder two-stroke cycle engines, having cylinders 680 mm. diam. by 1100 mm. stroke.

Passenger-Mail. The First Quadruple-Screw Mail and Passenger Motorship. Shipbldg. & Shipg. Rec., vol. 23, no. 25, June 19, 1924, pp. 725-730, 7 figs. Particulars of motorship Aorangi, of Union Steamship Co. of New Zealand. Length, 600 ft.; breadth, 72 ft.; depth, 46 ft. 6 in.; tonnage, 22,000 tons displacement. Main propelling machinery is of Fairfield Sulzer type, there being 4 distinct sets of 6-cylinder engines having cylinder diameters 27½ in. by 39 in. stroke. See speed, about 18 knots.

The First Motorship for Passenger and Mail Carrying in the North Sea. Mar. Engr. & Motorship Bldr., vol. 47, no. 561, June 1924, pp. 206-207, 1 fig. Notes regarding 1400-ton-deadweight vessel being built for United Steamship Co., Copenhagen, for fast passenger and mail service between Harwich and Esbjerg. Propelled by twin sets Burmeister & Wain 6-cylinder 4-stroke cycle trunk-piston type Diesel engines, developing 3800 i.hp. at 195 r.p.m.; length, 304 ft.; breadth, molded, 44 ft.

Power Plants. The Economic Powering of Motorships and a New Design of Oil Engine, A. E. L. Chorlton. Mar. Engr. & Motorship Bldr., vol. 47, no. 561, June 1924, pp. 219-226, 13 figs. Operating figures and details of Beardmore-Speedwell oil engine and of a ship in which it is fitted. Abstract of paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Reconditioning. Auxiliary Converted to Full Motor Power. Motorship, vol. 9, no. 5, May 1924, pp. 332-334, 5 figs. Propelling and auxiliary machinery is taken over bodily from war-time wooden motorship, and used to remake steel vessel formerly underpowered; steam auxiliaries replaced by wooden ship's electrical equipment; motorship has been renamed Admiral Peary.

Supercharging Engine. Forced Draft on Motorships Nets Big Operating Gains. Motorship, vol. 9, no. 3, Mar. 1924, pp. 179-182, 4 figs. Supercharging engine adds 500 i.h.p. to output

of motorship Tiradentes' 4-cycle engine; speed is increased and trips are shortened.

Transmission for. New Form of Transmission for Motorships. Nautical Gaz., vol. 106, no. 19, May 10, 1924, pp. 524-525, 1 fig. Combination of toothed gears and fluid coupling, placed between Diesel engine and propeller shafting. Makes possible a very material saving in weight and cost and offers entirely new operating possibilities.

Yachts. See YACHTS.

MUNITIONS

Manufacture. See INTERCHANGEABLE MANUFACTURE, Munitions.

Manufacturing, Industrial Mobilization for. The Role of the Engineer in Industrial Mobilization Planning, E. E. MacMorland. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 693-695 and (discussion) 695-696. Author shows how engineering societies can aid Government materially in its program of industrial mobilization in event of war, by providing reserve officers, giving advice on technical problems, assisting in development of new weapons, etc.

MUNTZ METAL

Corrosion, Sea-Water. See CORROSION, Muntz Metal.

N

NAILS

Manufacture. Manufacturing Nails by Automatic Machinery, H. P. Armson. Can. Machy., vol. 31, no. 17, Apr. 24, 1924, pp. 19-21, 3 figs. Practice at Graham Nail Works, Toronto, Can. Raw Material first "pickled" to remove scale, then coated with lime to assist lubrication and reduce wear on dies in drawing operation.

NAPHTHALENE

Hydrogenated. See TETRALIN.

Vapor Pressure. See BENZOL, Recovery.

Washers. British Methods of Naphthalene Removal, C. H. S. Tupholme. Gas Age-Rec., vol. 54, no. 20, Nov. 15, 1924, pp. 707-709, 4 figs. Gives average operating costs for English plant that is utilizing rotary naphthalene washers.

NATIONAL DEFENSE

Automotive Industry and. See AUTOMOBILE INDUSTRY, National Defense and.

Industrial Mobilization. See INDUSTRIAL MOBILIZATION.

NATURAL GAS

Canada. Natural Gas and Oil Possibilities in Canada, E. Coste. Natural Gas, vol. 5, no. 1, Jan. 1924, pp. 24-25 and 42. Notes on "petroliferous provinces" of North Western Ohio, South Western Ontario and Rock Mountains.

Carbon Black from. See CARBON BLACK.

Casinghead. Why Save Casinghead Gas, E. G. Sievers. Natural Gas, vol. 5, no. 4, Apr. 1924, pp. 3-4, 46 ans 48-49, 4 figs. Aspects of waste; methods of conserving casinghead gas; advantages of gas traps; loss of casinghead gasoline.

Constituents. Natural Gas in 1923, S. J. M. Auld. Instn. Petroleum Technologists—Jl., vol. 10, no. 46, Nov. 1924, pp. 803-810. Notes on natural-gas gasoline, carbon black, hard carbon and hydrogen, helium, and other constituents of natural gas. Special uses of natural gas.

Gasoline from. See GASOLINE, Natural-Gas.

Hydrogen Sulphide Removal. The Removal of Hydrogen Sulphide from Natural Gas, L. Logan and G. G. Desy. Natural Gas, vol. 5, no. 2, Feb. 1924, pp. 12-13, 36, 38, 40, 42, and 44, 5 figs. Describes process of liquid purification developed by Koppers Co., Pittsburgh, Pa.; description of conditions in Tilbury field of Union Natural Gas Co. of Canada, Ltd., which offer a typical example of problems that would be met in purification of natural gas, and experiments made to investigate completeness with which liquid purification process would meet these problems.

Impurities, Removal of. Solid and Liquid Impurities in Natural Gas and Means for Their Removal. Natural Gas, vol. 5, no. 5, May 1924, pp. 22-25, 56, and 66, 12 figs.

Industrial Utilization. Industrial Utilization of Natural Gas, H. J. Struth. Natural Gas, vol. 5, no. 1, Jan. 1924, pp. 32-33 and 42, 1 fig. Includes chart showing distribution of amount of gas produced in 1921; notes on industries using natural gas.

See also Constituents.

Killing Bad Well. Monroe Gasser Is Controlled by Novel Combinations of Principles. Nat. Petroleum News, vol. 16, no. 11, Mar. 12, 1924, pp. 63-64, 1 fig. Method used in "killing" a bad gas well, Smith No. 2, of Ouachita Natural Gas Co., Monroe, La.

Louisiana. Louisiana's Famous Monrol Gas Field, H. A. Wheeler. Eng. & Min. Jl.-Press, vol. 117, no. 2, Jan. 12, 1924, pp. 52-54. Long life assured, but exhaustion inevitable; porous limestone carries gas; rotary method used in drilling; 68 per cent of wells drilled productive; much of output used in making carbon black.

Properties, Appraisal of. See OIL FIELDS, Property Appraisal.

Statistics. Natural Gas in 1922, G. R. Richardson. U. S. Geol. Surv., no. II:31, Apr. 26, 1924, pp. 353-358. United States production and consumption statistics.

NAUTOGRAPH. See COMPASSES, Nautograph.

NAVAL AIRCRAFT

[See also WARSHIPS, British Empire Exhibition.]

Carriers. Seagoing Aircraft, S. Ballou, U. S. Nav. Inst.—Proc., vol. 50, no. 261, Nov. 1924, pp. 1793-1801, 1 fig. Deals with seagoing aircraft as affecting fleet actions at sea; characteristics of aircraft carriers; it is concluded that a fleet can best devote its aircraft-carrier capacity to protection of the big gun, rather than to adding small fraction in shape of bombing planes to its offensive power.

NAVAL ARCHITECTURE. See SHIP DESIGN.

NAVIGATION

Azimuth, Measurement. See AZIMUTH, Determination.

Compasses. See COMPASSES.

Depth Sounding—Depth Sounding—Its History and Achievement. Am. Shipping, vol. 18, no. 9, Sept. 1924, pp. 23-27, 3 figs. Describes apparatus designed, manufactured and installed by Submarine Signal Corpn., Boston, Mass.

See also SOUNDING.

Direction Finding. See DIRECTION FINDING.

Nautical Devices. Modern Navigational Devices, F. E. Smith. Engineer, vol. 138, no. 3593, Nov. 7, 1924, pp. 534-537, 7 figs. Deals with leader gear, subaqueous sound ranging and radio-acoustic method of position finding, echo sounding, and directional wireless.

Radio Fog Signals. See RADIOTELEGRAPHY, Fog Signals.

Route Recorder. The Baule System of Automatically Recording Traversed Route of Ships (Le traceur de routes système Baule), A. Baule. Technique Moderne, vol. 16, no. 4, Feb. 15, 1924, pp. 113-115, 6 figs. Device, called Nautographe, was designed by author for purpose of reproducing automatically on a chart the route covered by ship according to its displacement.

NEEDLES

Metallographic Examination of. Metallographic Examination of Sewing Needles (Metallographische Untersuchung über die Nähnadeln), D. Uno. Kyoto Imperial Univ., College of Sci.—Memoirs, vol. 7, no. 3, Mar. 1924, pp. 123-133, 6 figs. Discusses methods of production, properties of good needles, device for measuring fracture, conditions for production of samples with necessary properties.

NICKEL

Alloys. See NICKEL ALLOYS.

Deposits, Alaska. Alaskan Nickel Minerals, A. F. Buddington. Economic Geology, vol. 19, no. 6, Sept.-Oct. 1924, pp. 521-541, 4 figs. Study of specimens collected from outcrops of several recently discovered nickeliferous pyrrhotite deposits in southeastern Alaska; investigation was made with aid of metallographic microscope.

Deposits, Sudbury, Ontario. A Study of the Sudbury Ore Deposits, A. Wandke and Rob. Hoffman. Economic Geology, vol. 19, no. 2, Mar. 1924, pp. 169-204, 5 figs. General geology and ores; thories of origin; genesis of deposits, and bearing of gensis upon development and exploration; nickel eruptive.

Detection of. See COBALT, Detection of.

Determination in Ores and Alloys. Determination of Nickel in Ores and Alloys by Means of Dimethylglyoxime (Het bepalen van nikkel met dimethylglyoxim in ertsen en legeeringen), J. G. Weeldenburg. Chemisch Weekblad, vol. 21, no. 30, July 26, 1924, pp. 358-362. Influence of common metals was examined; material is dissolved in aqua regia, and lead and alkaline-earth metals are removed as sulphates; filtrate is treated with hydrogen sulphide, and nickel determined in filtrate after addition of tartaric acid and ammonium chloride; if iron and cobalt are present together, former must be reduced before precipitation.

Electrolytic. Mechanically Perfect Electrolytic Nickel, Chas. P. Madsen. Am. Electrochem. Soc.—Advance paper, no. 28, for meeting Apr. 24-26, 1924, pp. 371-378. Means are described for producing electro-nickel almost equal to pure gold in ductility; use of hydrogen peroxide in bath is claimed to be absolute cure for pits, and exerts other beneficial effects; anode is described which gives consistently good results in above-mentioned bath.

The Structure of Electrolytic Nickel (Das Gefüge des Elektrolytnickels), G. Wazau. Zeit. für Metallkunde, vol. 16, no. 12, Dec. 1924, pp. 482-483, 7 figs. Causes of fracture and remedies.

Mines, Pennsylvania. A Note on the Lancaster Gap Mine, Pennsylvania, T. C. Phemister. Jl. of Geology, vol. 32, no. 6, Aug.-Sept. 1924, pp. 498-510, 8 figs. Results of visit to mine last worked in 1900. Records a series of observations both of field relations and of microstructure of this nickel ore body. Igneous theory of origin of deposits is brought into question and a hydrothermal view of genesis put forward.

Ore, Nevada. Nickel Ores from Key West Mine, Nevada, W. Lindgren and W. M. Davy. Economic Geology, vol. 19, no. 4, June-July 1924, pp. 309-319, 6 figs. Discusses occurrence and composition of ore; composition of sulphides, genesis of ore minerals.

Passivity. See METALS, Passivity.

Plating. See ELECTRODEPOSITION, Nickel.

NICKEL ALLOYS

Copper-Zinc-Nickel. Some Low Copper-Nickel Silvers, W. B. Price and C. G. Grant. Am. Inst. Min. & Met. Engrs.—Trans., no. 1303-N, Feb. 1924, 14 pp., 15 figs. Results of investigation undertaken to check work of L. Guillet on special brasses and to determine more accurately effect of addition of nickel on microstructure of binary alloys of copper and zinc; best hot- and cold-working nickel silvers.

Monel Metal. See MONEL METAL.

Nickel-Chromium. Magnetization of Nickel-Chrome Alloys Below the Curie Point (Aimantation des alliages nickel-chrome au-dessus du point de Curie), J. Safráneck. Revue de Métallurgie, vol. 21, no. 2, Feb. 1924, pp. 87-111, 20 figs. Study of alloying of ferromagnetic metal with paramagnetic metal; theory of paramagnetism of Langevin and the Curie law; Weiss's theory of ferromagnetism; thermal variation of spontaneous magnetization; application of Weiss's formula to nickel-chrome alloys; description of experimental apparatus; preparation of alloys; fusion of alloys; metallographic investigation. Bibliography.

Permalloy. Permalloy, A New Magnetic Material of Very High Permeability, H. D. Arnold and G. W. Elmen. Elec. Communication, vol. 2, no. 4, Apr. 1924, pp. 226-231, 7 figs. Describes a magnetic alloy which is a composition of about 78.5 per cent nickel and 21.5 per cent iron and at magnetizing fields in neighborhood of 0.04 gauss and with proper treatment has a permeability running as high as 90,000.

The Reductivity of the Recently Discovered Magnetic Metal Permalloy, A. E. Kennelly. Franklin Inst.—Jl., vol. 197, no. 5, May 1924, pp. 623-627, 2 figs. Gives data on observations of permalloy.

See also CABLES, ELECTRIC, Permalloy-Loaded.

Properties. A Note on the Properties of some Alloys of Nickel, W. R. Barclay. Soc. Glass Technology—Jl., vol. 8, no. 31, Sept. 1924, pp. 162-173, 3 figs. Deals with nickel-copper and nickel-chromium alloys which are said to be of greatest interest to glass technologists, because of their great resistance to corrosion and their retention of strength at high temperatures.

NICKEL-CHROMIUM STEEL. See CHROME-NICKEL STEEL.

NICKEL PLATING

Acidity Controlling Instrument. The Double Wedge Comparator, E. D. Stirlen. Brass Wld., vol. 20, no. 7, July 1924, pp. 235-236, 2 figs. Describes instrument for controlling acidity of nickel and zinc-plating solutions.

Automatic. Automatic Electroplating Installation. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, p. 525, 1 fig. Describes electroplating equipment installed at plant of Walden-Worcester, Worcester, Mass., by means of which wrench handles are nickel-plated automatically.

Black. Black Nickel Plating, H. B. Maxwell. Metal Industry (N. Y.), vol. 22, no. 11, Nov.

1924, p. 449. Composition of solution and methods of analysis for controlling it.

Durability of Surfaces. Durability of Plated Surfaces, W. M. Phillips. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 461-463, 5 figs. See (abstract) in Am. Mach., vol. 61, no. 19, Nov. 6, 1924, pp. 738-739. Importance of cleansing; polishing; plating is said to be most important part of process; cost and testing.

Packard Car Co. Process. Quality of Nickel Finish is Improved by Packard Researches. Automotive Industries, vol. 50, no. 12, Mar. 20, 1924, pp. 676-678, 3 figs. Changes in equipment and methods have resulted in coating of increased depth and greater hardness; steel radiator shell replaces brass type formerly used; spray tests are favorable; immersion time, current, and strength of bath determine quality.

Steel, Rust Resistance. Rust Resistance of Nickel-Plated Steel, E. M. Baker. Soc. Automotive Engrs.—Jl., vol. 14, no. 2, Feb. 1924, pp. 127-133, 9 figs. Numerical method of rating of appearance of plated steel after exposure to action of salt spray; rust resistance of steel plated with nickel is shown to be dependent on thickness of plating; effect of salt-spray resistance of some common variables in nickel plating; sets forth advantages of controlled electroplating at high current densities.

Troubles. Diseases of Nickel Deposits, Wm. Voss. Metal Industry (N. Y.), vol. 22, nos. 2 and 4, Feb. and Mar. 1924, pp. 66-67 and 153-154. Symptoms, causes, and cures of unsatisfactory deposits.

NICKEL SILVER. See NICKEL ALLOYS, Copper-Zinc-Nickel.

NICKEL STEEL

Annealing. See STEEL, HEAT TREATMENT OF, Annealing.

Carburization. Heat-Treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 23, no. 588, Jan. 3, 1924, pp. 446-449. Carburization of nickel steels.

See also STEEL, HEAT TREATMENT OF, Nickel-Steel Carburization.

Heat Treatment. See STEEL, HEAT TREATMENT OF, Turbine Blading.

Martensitic, Softening of. The Softening of a Martensitic Nickel Steel (Weichmachen eines martensitischen Nickelstahls), N. H. Aall. Stahl u. Eisen, vol. 44, no. 36, Sept. 4, 1924, pp. 1080-1081. Martensitic structure of a nickel steel with 0.65 per cent carbon and 13.7 per cent nickel can be changed into a readily workable osmonditic structure by tempering.

Quenching. Quenching Properties of Glycerin and Its Water Solutions, H. Scott. Am. Soc. for Steel Treating—Trans., vol. 6, no. 1, July 1924, pp. 13-31, 5 figs. Results of experiments with glycerin, etc., and oil-water emulsion to find quenching media between water and oil, show that effect is slight but definitely reflected by scleroscope and Rockwell hardness of deep-hardening tool steels cooled at rates faster than their critical rate.

Strength at High Temperatures. See IRON AND STEEL, Strength at High Temperatures.

NITRATES

Chilean Industry. Nitrogen Survey. The Cost of Chilean Nitrate, H. F. Bain and H. S. Mulliken. Trade Information Bul. (Supp. to Commerce Reports), no. 170, Jan. 7, 1924, 69 pp., 3 figs. General survey of Chilean nitrate industry with particular reference to determining quantity of supplies and lowest price at which natural nitrate can be furnished to American consumers under conditions of maximum efficiency of production and minimum charges and profits. Discusses mode of occurrence and mining conditions, treatment and recoveries, etc.

Fires. Famous Nitrate Fires of History, Chas. E. Munroe. Chem. & Met. Eng., vol. 31, no. 25, Dec. 22, 1924, pp. 962-966, 7 figs. Authentic account of great industrial conflagrations involving nitrates of sodium and potassium.

Mining, Chile. Modern Methods of Mining Caliche, C. M. Briceno. Explosives Engr., vol. 2, no. 6, June 1924, pp. 181-184, 13 figs. Replacing hand-drilling methods by machines in Chilean nitrate fields.

NITRIC ACID

Oxidation of Ammonia to. See AMMONIA, Oxidation to Nitric Acid.

Plants, Acid-Resisting Iron for. Acid-resisting Iron for Nitric Acid Plant, S. J. Tungay. Chem. Age (Lond.), vol. 11, no. 277, Oct. 4, 1924, pp. 25-27, 4 figs. Advantages of iron-silicon alloys for construction of nitric acid plant, and discussion of modern tendency to favor units of moderate size, particularly for use in India and Far East.

NITROCELLULOSE

Gelatinization of Solutions. Gelatinization of Nitrocellulose Solutions (Ueber Gelatinierung von Nitrozelluloselösungen), A. Szegvari. Kolloid-Zeit., vol. 34, no. 1, Jan. 1924, pp. 34-37, 3 figs. Solutions of nitrocellulose in amyl actetate, ether alcohol, acetone, etc., when diluted with non-solvent for nitrocellulose (benzine, benzol, tetralin), gelatinize on elevation of temperature, but on lowering temperature again they re-liquefy; temperature of gelatinization depends on composition of liquid medium; phenomenon is attributed to solvation.

Lacquers. Nitrocellulose and Pyroxylin Lacquers, J. B. Wiesel. Chem. Age (N. Y.), vol. 32, no. 11, Nov. 1924, pp. 439-442. Notes on nitrocellulose lacquer and pyroxylin; nitrocellulose manufacture and hazards; nitrocellulose enamels; composition of lacquers.

NITROGEN

Ammonia from. See AMMONIA, Formation from Nitrogen.

Estimation. Application of "Formol Titration" to the Kjedahl Methol of Estimating Nitrogen, W. S. Shaw. Analyst, vol. 49, no. 585, Dec. 1924, pp. 558-565. Results of experiments to determine accuracy of formol titration method and to devise suitable modification of method.

Fertilizing Purposes. The Utilization of Nitrogen in Soils and Fertilizers as Affected by Lime, J. G. Lipman and A. W. Blair. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 373-375. Review of experiments started at N. J. Agricultural Experiment Station in 1898 for purpose of studying certain phases of nitrogen problem as related to crop production.

Fixation and Fixation Processes. Do Green Plants Have the Power of Fixing Elementary Nitrogen from the Atmosphere? C. B. Lipman and J. K. Taylor. Franklin Inst.—Jl., vol. 198, no. 4, Oct. 1924, pp. 475-506. Experiments carried out with wheat and barley in culture solutions proved conclusively that cultures gained nitrogen at expense of elementary nitrogen of atmosphere; results of experiments with other plants. Bibliography.

Electrical Nitrogen Production [Den elektriske kvaelstofforbraendingsproces (Iyssbueprocessen)], O. Jensen. Teknisk Ukeblad, vol. 71, nos. 45 and 46, Nov. 19 and 25, 1924, pp. 384-385

and 395-397, 4 figs. German industry, which uses ammonium process, produces 300,000 to 400,000 tons nitrogen per year, while Norway, using electrical method, produces about 25,000 tons. Discusses whether or not electrical method can be further developed to meet this competition; gives detailed description of process in electric arc and arrives at conclusion that development of suitable electrodes is most important problem which must be solved.

Nitrogen Fixation. Canada, Honorary Advisory Council for Sci. and Indus. Research—Bul. no. 11, 1924, 28 pp. What nitrogen is and where it is found in nature; practical application of nitrogen; principal forms and sources, and methods of production of combined nitrogen; present status of nitrogen fixation in various countries; some data and statistics relating tonitrogen. Principal contents of the various reports of Nitrogen Fixation Committee (Canada), including appendices thereto. Brief bibliography of important sources of information relating to nitrogen.

Nitrogen Fixation at Billingham. Chem. Age (Lond.), vol. 10, no. 261, June 14, 1924, pp. 619-620. Describes Brunner-Mond process for fixation of atmospheric nitrogen.

Nitrogen Fixation Processes, L. F. Goodwin. Can. Chem. & Metallurgy, vol. 8, no. 7, July 1924, pp. 158-161. Gives résumé of recent progress; discusses synthetic ammonia, Casale and Fauser processes.

Report of the Fixed Nitrogen Research Laboratory, Fred. G. Cottrell. Chem. Age (N. Y.), vol. 32, no. 12, Dec. 1924, pp. 485-487. Direct synthetic ammonia process; cyanides; hydrogen production; nitrates; cyanamide; nitrogen fixation by microörganisms; oxides of nitrogen and nitric acid; active nitrogen and chemical reactivity.

The Air-Nitrogen Processes, J. M. Braham. Trade Information Bul. (Supp. to Commerce Reports), no. 240, June 16, 1924, pp. 1-41. Describes arc, cyanamide, synthetic ammonia, and miscellaneous nitrogen fixing processes; interrelation of nitrogen-fixing processes and products.

The "American Process" for Nitrogen Fixation. Chem. & Met. Eng., vol. 30, no. 24, June 16, 1924, p. 948, 1 fig. Direct synthetic process developed at Fixed Nitrogen Research Laboratory, Washington.

The Fixation of Nitrogen as Cyanide, R. Franchot. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 235-238. When working at capacity of 40 million tons of pig iron, American blast furnace is fixing nitrogen at probable rate of 6,000,000 tons a year; this is double the rate at which it has been estimated that nitrogen is taken from soil in crops; hearth of blast furnace in United States develops 12 million kw. of which 25 per cent is apparently available for and absorbed in work done at 1500 deg. cent.; there appears to be power of order of 2 million hp., not only developed and available, but actually already engaged in nitrogen fixation.

Trend of Developments in the Nitrogen Problem, J. M. Braham. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1277-1280, 3 figs. Commercial fixation; arc, cyanamide, and direct synthetic processes; other processes; power requirements of fixation processes.

United States, Situation in. General Review of the Nitrogen Situation in the United States, H. A. Curtis. Trade Information Bul. (Supp. to Commerce Reports), no. 226, May 5, 1924, 63 pp., 7 figs. Gives general review of situation based primarily on statistical data, and shows place which Chilean nitrate holds in supplying nitrogen needs of Nation. Particular attention given to domestic sources of nitrogen supply, with idea of ascertaining to what extent domestic production may be relied upon to meet requirements in near future.

NITROGLYCERIN

Explosive Decomposition. Explosive Decomposition of Nitroglycerin (Sur la décomposition explosive de la nitroglycérine), M. Audibert. Académie des Sciences—Comptes Rendus, vol. 178, no. 14, Mar. 31, 1924, pp. 1167-1169. Explosive decomposition is not instantaneous, since nature of gaseous products of reaction varies with rate of cooling; residual reaction is dependent on conditions; account and results of tests.

Substitutes. See EXPLOSIVES, Nitroglycerin Substitutes.

NOMOGRAPHIC CHARTS. See ALIGNMENT CHARTS.

NON-FERROUS METALS

[See also ALLOYS, Non-Ferrous; ALUMINUM; COPPER; ZINC; etc.]

Aircraft Construction. See AIRCRAFT CONSTRUCTION MATERIALS, Light Metals.

Cold Rolling vs. Drawing. Cold Rolling Compared with Drawing, C. E. Davies. Metal Industry (Lond.), vol. 25, nos. 6 and 7, Aug. 8 and 15, 1924, pp. 121-123 and 149-152, 13 figs. Discusses cases in which cold rolling can wholly or partly be substituted for drawing in production of many sections, comparing respective advantages and disadvantages.

Deoxidizers for. Explains Use of Deoxidizers, C. Vickers. Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 684-686. Value of deoxidizers in nonferrous metals and alloys depends solely upon ability of melter to know when and how to apply them properly.

Metallurgical Processes, Waste Elimination. Eliminating Waste in Non-Ferrous Metallurgical Processes. Metal Industry (Lond.), vol. 25, nos. 6 and 7, Aug. 8 and 15, 1924, pp. 127-129 and 134 and 152-154, 2 figs. Discusses treating manufactory scrap and by-products; flue dust; smelting and concentration of residue.

Metallurgy, United States. Non-Ferrous Metallurgy in America, M. Corse. Iron Age, vol. 114, no. 12, Sept. 18, 1924, pp. 693-694. Discusses recent developments in United States with particular reference to such subjects as nickel, aluminum, bronze and long-life molds. Abstract of address before British Inst. Metals.

Metallurgy of. See METALLURGY, Non-Ferrous.

NOVOCRETE. See CONCRETE, Novocrete.

NOZZLES

Steam, Design of. Third Report of the Steam Nozzles Research Committee. Engineering, vol. 117, no. 3047, May 23, 1924, pp. 681-685, 14 figs. Summary of previous reports; test results; conclusions. Report presented before (Brit.) Instn. Mech. Engrs. See (discussion), p. 657, and (editorial), pp. 673-674. See also Engineer, vol. 137, no. 3569, May 23, 1924, pp. 574-575 and 577, 9 figs, and (editorial) p. 572; full report in Instn. Mech. Engrs.—Proc., no. 5, 1924, pp. 715-735, 5 figs.

NUTS

Lock. See LOCK NUTS.

Standardization. See BOLTS, Standardization.

O

OFFICE BUILDINGS

Construction. See BUILDING CONSTRUCTION, Office Buildings.

Heating and Ventilating. See HEATING AND VENTILATION, Office Buildings.

Substructures. See CONCRETE CONSTRUCTION, REINFORCED, Office-Building Substructures.

Ventilation. See VENTILATION, Office Buildings.

OFFICES

Conveying in. See MATERIALS HANDLING, Offices.

OIL

Analysis of Waters in Beds. The Elements Associated with Petroleum, J. E. Hackford. Oil Eng. & Finance, vol. 5, no. 98, June 1924, pp. 344-346. Shows how valuable to chemist is exact interpretation of results of analysis of waters that accompany petroleum, in natural beds.

Ash from. Petroleum Ash, W. H. Thomas. Instn. Petroleum Technologists—Jl., vol. 10, no. 42, Apr. 1924, pp. 216-220. Analysis of percentage and constituents of ash in different oils.

Australasia. Where Oil Deposits Occur in Australasia, E. De Hautpick. Min. Jl., vol. 147, nos. 4653, 4654, 4656, 4657, 4658, and 4659, Oct. 25, Nov. 1, 8, 15, 22, 29, and Dec. 6, 1924, pp. 829-830, 845-847, 865-866, 884-885, 901-902, 922 and 943-945, 1 fig. Results of exploration work to study possibilities in reference to existence of oil areas in British Empire; geology; deformation of earth's crust; conclusions.

Australia. Prospecting for Oil in Australia, E. De Hautpick. Min. Jl., vol. 146, no. 4637, July 5, 1924, 548-550. Chemical composition of underground waters as one of guides to investigation for oil, with special reference to Coorong Field, So. Australia.

Baku. The Petroleum Situation at Baku (La situation pétrolifère actuelle à Bakou), M. Aldebert. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 1-2-3, Jan.-Mar. 1924, pp. 87-112. Gives details of geology of oil region and Apsheron Peninsula, activity of refineries, oil reserves, transportation, financial matters, etc.

Bibliographies. Current Bibliography, W. J. Wilson. Instn. Petroleum Technologists—Jl., vol. 10, nos. 24, 45, and 46, Sept. and Nov., 1924, pp. 51A-92A, 195A-231A, and 263A-303A. Covers geology, geography, drilling and field operations, pipe lines, transportation and storage, refinery technique, natural gas, motor fuels, lubrication, testing, cracking and hydrogenation, shale and shale oils, etc.

Current Bibliography of Foreign Petroleum Resources. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 2, Mar.-Apr. 1924, pp. 251-260. Pub. by permission U. S. Geol. Surv.

Recent Articles on Petroleum and Allied Substances, H. Britton. U. S. Bur. Mines, Jan. 1924, 34 pp.; Feb., 32 pp.; Apr., 32 pp.; July, 34 pp.; Aug., 23 pp.; Sept., 24 pp.; Oct., 24 pp.; Nov. 29 pp.; and Dec., 31 pp. Compilation of articles on history, geographic occurrence, geology, origin, development and production, transportation, storage, distribution, properties and their determination, refining and refineries, utilization, legislation, etc.

Brazil. Is There Petroleum in Brazil? David T. Day. Oil Eng. & Finance, vol. 5, no. 98, June 1924, pp. 331-333. Shows there is lack of geological data and importance of petroleum development.

British Empire. Crude Oils of the Empire, A. E. Dunstan and Jas. Kewley. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 486-521 and (discussion) 522-526. Statistics of resources and production.

Bulk Distribution. Bulk Distribution of Oil. Depots and Storage, F. W. Black. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 584-603 and (discussion) 604-605. Review of problems of oil storage and bunkering.

Burma. Distribution of Petroleum in Burma, G. P. Chaplin. Min. Mag., vol. 30, no. 5, May 1924, pp. 265-270, 5 figs. Outline of present problems of oil industry in Burma.

California. Chemical Characteristics of California Petroleums, P. W. Prutzman. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 560-575, 1 fig. Location of deposits; refining of cold-test and waxy oils; impurities in asphaltic oils.

California Production and Reserves. California Oil Production and Reserves, R. E. Collom and R. M. Barnes. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 2, Mar.-Apr. 1924, pp. 212-237 and (discussion) 237-239, 2 figs. Information on status of California oil production as a whole; geographic relationship and economic importance of the various oil fields of the state; quantity and quality of their production; brings down to July 1, 1923, estimates of oil reserves, made by California Committee of Am. Assn. Petroleum Geologists, as of July 1, 1921.

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Californian, Chemical Properties. The Chemical Properties of Californian Petroleums, P. W. Prutzman. Petroleum Times, vol. 11, no. 262, Jan. 12, 1924, pp. 51-52. Chemical treatment of crudes of Group 2; the Edeleanu process; by-products; impurities in asphaltic oils.

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Petroleum Resources of the Dominion of Canada, M. Chose. Compressed Air Mag., vol. 29, no. 1, Jan. 1924, pp. 751-753, 7 figs. Brief review of petroleum situation in Canada.

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Chemical Raw Material. Petroleum as a Chemical Raw Material, B. T. Brooks. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 185-189. Reasons for slow development of petroleum chemistry; isolation of hydrocarbons from petroleum;

study of typical pure hydrocarbons; problems with regard to unsaturated hydrocarbons in lubricating-oil distillates.

Colombia. Petroleum Laws of Colombia (Über die Erdölgesetze Kolumbiens). Petroleum Zeit., vol. 20, no. 15, May 20, 1924, pp. 660-667. Decrees of 1922 and 1923 regulating oil production, etc.

Colorado. Survey of Petroleum Progress, C. M. Rath, F. H. Lahee, H. T. Morley and J. R. Jones. Min. & Metallurgy, vol. 5, no. 212, Aug. 1924, pp. 378-383, 1 fig. Series of articles covering present status of petroleum industry in Colorado; New Richland Field, Navarro County, Texas; evaporation losses in field storage tanks; extensions of prospecting permits.

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Coorongite. The Coorong Oil Company of Australia, E. de Hautpick. Petroleum Times, vol. 12, nos. 302 and 303, Oct. 18 and 25, 1924, pp. 623-624 and 665-666. Résumé of report upon properties of coorongite.

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Petroleum Cracking Processes and Future Production Problems, T. A. Boyd. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1004-1006. Review of developments and prospects.

Recent Development in the Art of Cracking, A. E. Dunstan and R. Pitkethly. Instn. Petroleum Technologists—Jl. vol. 10, no. 46, Nov. 1924, pp. 728-757 and (discussion) 757-774, 17 figs. partly on supp. plates. Discusses some processes which authors have personally investigated. Vapor phase process; atmospheric pressure.

The Dubbs Cracking Process, G. Egloff. Petroleum Times, vol. 12, no. 311, Dec. 20, 1924, pp. 983-985, 1 fig. Account of achievements.

The Dubbs Process for Cracking Oil. Petroleum Times, vol. 12, no. 287, July 5, 1924, pp. 5-8, 2 figs. Principles of Dubbs process, equipment and operation, commercial results, results with heavy oils and cracking products.

What About the Future of the Cracking Process? R. H. Brownlee. Chem. & Met. Eng., vol. 31, no. 22, Dec. 1, 1924, pp. 848-852, 4 figs. Probable developments may result in revival of vapor-phase and lower pressure equipment, with perhaps increased interest in catalytic and chemical processes.

Cracking, Catalyst for. See CATALYSTS, Oil-Cracking.

Crude. Crude Oils and Refined Products, J. L. Strevens. Chem. Eng. & Min. Rev., vol. 16, nos. 186 and 187, Mar. 5 and Apr. 5, 1924, pp. 213-217 and 271. Oil seepages; well oils; kinds of crude oils; constituents of crude oils; calorific values of fuel oils; oil refining; specifications of chief petroleum products imported into Australia.

The Crude Oils of the Empire, A. E. Dunstan and J. Kewley. Petroleum Times, vol. 11, no. 284, June 14, 1924, pp. 835-836. Discusses Great Britain, Canada, Burma and Assam, Australia, New Zealand, Trinidad, and Sarawak. Summary of paper read at Mining and Metallurgical Congress at Wembley.

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Crude, Sarawak. The Crude Oil of Sarawak, J. Kewley. Instn. Petroleum Technologists—Jl., vol. 10, no. 41, Feb. 1924, pp. 42-50. Production data; general characteristics, and chemical characters; products from Miri crude oil.

Crude, Transportation of. Transportation of Crude Oil, A. S. Jones. West. Machy. Wld., vol. 15, no. 9, Sept. 1924, pp. 290-291 and 296, 3 figs. Types of pumping stations generally in use, and notes on operation.

Czechoslovakia. The State Mineral Oil Mines in Gbley, Czechoslovakia, 1913-1922 [Die staatlichen Naphthagruben von Gbley in der Slowakei (1913 bis 1922)], E. Schnabel. Petroleum Zeit., vol. 20, no. 18, June 20, 1924, pp. 835-850, 8 figs. Discusses geology of oil and gas regions, development of mining operations, analyses of oils and gases. Bibliography.

Dehydration. The Electrical Dehydration of Cut Oil, F. D. Mahone. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1354-P, July 1924, 5 pp. Much crude oil, as produced from well, carries varying amounts of water, which may be present as free water in globules sufficiently large to settle out, in time, if fluid is allowed to stand, or as an emulsion formed by myriads of minute water particles, each surrounded and entrapped by a film of oil through which it cannot break under action of gravity alone. Such an emulsified mixture of oil and water is termed "cut oil." Describes apparatus for breaking up emulsion.

The Electrical Process for the Dehydration of Crude Oil Emulsions, A. J. Houston. Petroleum Wld., vol. 21, no. 289, Oct. 1924, pp. 424-425. See also Petroleum Times, vol. 12, no. 298, Sept. 20, 1924, pp. 453-454. Advantages of electrical dehydration process; description of "P.R." electric dehydrators; results achieved by electrical method of treating crude oil emulsions.

Desulphurizing. Desulphurization of Mineral-Oil Distillates by Means of Hypochlorite (Ontzwaveling van aardoliedestillaten met hypochloriet volgens Dunstan en Brooks), H. I. Waterman and J. H. Heimel. Chemisch Weekblad, vol. 21, no. 32, Aug. 9, 1924, pp. 374-375. Results obtained by Dunstan and Brooks with Persian oils have been confirmed and extended to Mexican oils.

The Desulphurising of Crude Oil Distillates by Means of Hypochlorite, after the Method of Dunstan and Brooks, H. I. Waterman and J. H. Heimel. Instn. Petroleum Technologists—Jl., vol. 10, no. 46, Nov. 1924, pp. 812-815. Describes experiments with distillates of Mexican oil.

See also Refining.

Developments. A Review of Petroleum Developments Abroad in 1923. Commerce Reports, no. 4, Jan. 28, 1924, pp. 222-225. Problems in marketing conditions; proposed oil legislation in Argentina; explorations conducted in other South American countries; Rumanian oil legislation; concessions in Persia and Near East; British Indian production; development active in Latin America; Polish production recovering; Japanese production declines; etc.

Distillates, Refining. Catalytic Treatment of Cracked Distillates in the Vapor Phase, T. T. Gray and M. R. Mandelbaum. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 913-916, 3 figs. Preliminary description of method of refining cracked distillates which is intended to obviate value losses due to reaction of sulphuric acid with olefins present; advantages of vapor-phase catalytic process.

The Hypochlorite Process, A. E. Dunstan,

Instn. Petroleum Technologists—Jl., vol. 10, no. 42, Apr. 1924, pp. 201-215, 1 fig. on supp. plate. Describes method of refining petroleum distillates by dilute hypochlorite solutions; action of hypochlorite on sulphur compounds; Mather and Platt's patent electrolyser, vertical flow type; advantages of hypochlorite processed as compared with use of sulphuric acid.

Distillation. A New Method of Distilling Petroleum (Ein neues Verfahren zur Destillation von Erdölen), W. Boormann. Petroleum, vol. 20, no. 28, Oct. 1, 1924, pp. 1417-1422, 1 fig., and (translation) Petroleum Times, vol. 12, no. 303, Oct. 25, 1924, pp. 649-650. Discusses Borrmann continuous steam system in which oil is continuously led through tubes, only 100 to 200 liters of it being in heating chamber at a time; cost data.

Better Fractionation of Condensates. Oil & Gas Jl., vol. 23, no. 20-A, Oct. 9, 1924, pp. 200 and 245-249, 7 figs. Details of patent of E. Owen, of New York City. Apparatus relates more particularly to distillation of petroleum and seeks for one of its principal objects to provide a means for effecting a more perfect separation of hydrocarbons which are evolved as a body of mixed vapors from a still, into distinct fractions than has heretofore been accomplished.

The Design of Oil Distillation Equipment, E. H. Leslie. Oil News, vol. 12, no. 2, Feb. 1924, pp. 11-12 and 47, 2 figs. Discusses packed versus bubbler-cap columns; evolution of bubbler cap, working versus perfect sections, etc.

The Reasons for Steam Distillation, E. H. Leslie. Oil News, vol. 12, no. 5, May 1924, pp. 13-14. Review of principles of distillation with steam.

Use of Inert Gases Instead of Steam in Petroleum Distillation, L. Gourvich and B. Kaminer. Petroleum & Oil Shale Industry (Russia), vol. 8, no. 8, 1924, pp. 334-340. Data of tests limited to distillation of upper fractions such as lubricating oil carried out with crude oil by semi-distilled products such as mazout. (In Russian.)

Emulsified. Emulsion Oil and Experiments of Its Decomposition, C. Kovalevski. Azerbeijan Oil Industry (Russian Oil Paper), no. 7-8, July-Aug. 1924, pp. 33-35. (In Russian.)

Emulsions, Destroying. See EMULSIONS, Oil.

Engineering Applications. Petroleum Engineering, C. Dalley. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 459-476 and (discussion) 476-485, 18 figs. partly on supp. plates. Notes on storage tanks; pipe-line pumping plant; refinery requirements; specification of mild-steel oil-storage tanks 116 ft. diam. by 40 ft. deep, 2,600,000-gal. cap.

Engines. See OIL ENGINES.

Evaporation Loss. Evaporation Loss of Petroleum Theories and Their Application, J. H. Wiggins. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1353-P, July 1924, 8 pp. Abstract in Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 595-596. Pictures economic phase of evaporation losses and actual evaporative conditions in handling and storing crude and gasoline in United States; discusses some of the theories of physics involved in evaporation loss, and describes application of these theories to the handling of oil and gas on producing properties.

Fats, Production from. Petroleum from Vegetable and Animal Fats. Petroleum Times, vol. 12, no. 306, Nov. 15, 1924, p. 770. Describes methods of making use of local fatty oils for producing petroleum-like hydrocarbons devised by Prof. Mailhe, of Toulouse University, France. Abstracted translation from Petroleum.

Fields. See OIL FIELDS.

Fractionating. Fractional Distillation for the Separation of the Constituents of Petroleum, W. A. Peters, Jr. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1126-1130, 9 figs. Summarizes theory of fractional distillation with mathematical formulas used for calculating fractionating columns; suggests method for calibrating fractionating columns to be used in petroleum work in order to determine proper balance between heat consumption, column efficiency, and sharpness of cut to be obtained.

The Theory of Fractionating Condensation, F. H. Leslie. Oil News, vol. 12, no. 3, Mar. 1924, pp. 15-16, 2 figs. Outlines basic theory of fractionating condensation or dephlegmation. Believes that separation of gasoline from petroleum should be effected by fractional distillation rather than fractional condensation, but realizes that for practical reasons or considerations of expediency dephlegmator will frequently be used.

France. Exploration for Petroleum in the Limagne, France, A. Werenfels. Am. Inst. Min. & Met. Engrs.—Trans., no. 1385-G, Dec. 1924, 7 pp., 3 figs. After discussing geology, surface indications of petroleum and recent exploration, author states that none of wells were properly located and that oil possibilities have not been adequately tested.

Petroleum in France (Le pétrole en France), C. Finaton. Vie Technique & Industrielle, vol. 5, nos. 56 and 58, May and July 1924, pp. 77-80 and 226-231, 11 figs. Discusses hydrocarbons of Pyrenees, oil indications in Landes, Béam and Basque country, geology, etc.; tectonics.

Petroleum Mines, C. Camsell and A. Buisson. Can. Min. Jl., vol. 45, no. 15, Apr. 11, 1924, pp. 352-355. Recovery of petroleum by shafts and galleries at Pechelbronn, Alsace, France, and at Wietze, Hanover, Germany.

Petroleum Researches in France and the Borings at Gabian [Les recherches de pétrole en France et le sondage jaillissant de Gabian (Hérault)], R. Brunschweig. Génie Civil, vol. 85, no. 25, Dec. 20, 1924, pp. 567-571, 5 figs. New French petroleum laws; geology of Gabian district, borings and storage at Frontignan, and properties of Gabian oil.

The Recovery of Petroleum at Pechelbronn, C. Camsell and A. Buisson. Petroleum Times, vol. 11, no. 278, May 3, 1924, pp. 635-638, 3 figs. Recovery of petroleum by shafts and galleries at Pechelbronn, Alsace, France.

Fuel. See OIL FUEL.

Gasification Capacity, Testing. The Testing of Petroleum Oils for Gasification, A. Holmes. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 258-261. Summary of investigation conducted to establish possibility of determining gasification capacity of petroleum oils from laboratory tests.

Genesis and Geology. Petroleum: Its History, Genesis, and Geology, Jas. Park. New Zealand Jl. Sci. & Technology, vol. 7, no. 3, Sept. 1924, pp. 147-154. Historical review; chemistry of petroleum; origin and geology; migration and accumulation of oil and gas; principles of oil accumulation; favorable rock structures; favorable oil indications; selecting site of oil well.

Petroleum Geology, T. Dewhurst. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 395-425 and (discussion) 426-431, 2 figs. Distribution of petroleum of various geological systems; nature of oil measures and occurrence of petroleum in a few oil-bearing countries; migration of petroleum; drilling methods as they affect recording of evidence of concealed strata, etc.

Gulf Coastal Plain, U. S. Oil Development in Gulf Coastal Plain during 1923, E. T. Dumble and W. F. Bowman. Am. Inst. Min. & Met. Engrs.—Trans., no. 1332-P, Mar. 1924, 7 pp. Survey of production, developments, and drilling methods.

Hydrogenation. Hydrogenation by the Bergius Method, H. I. Waterman and J. N. J. Perquin.

Instn. Petroleum Technologists—Jl., vol. 10, no. 45, Sept. 1924, pp. 670-677, 2 figs. Summary of most important results of research taken up concerning scientific and technical significance of Bergius' hydrogenation process.

New Facts Relating to the Bergius Process. Petroleum Times, vol. 11, no. 263, Jan. 19, 1924, p. 100. A process of hydrogenation. From article by P. Bruylante in Bul. de la Société Chimique Belge.

The Berginisation of Coal and Oil, A. W. Nash. Instn. Petroleum Technologists—Jl., vol. 10, no. 43, June 1924, pp. 329-334, 3 figs. Discusses artificial production of coal, hydrogenation of oil, and plant arrangement and equipment.

The Bergius Process (Le procédé Bergius), A. Kling. Chimie & Industrie, vol. 11, no. 6, June 1924, pp. 1067-1077, 8 figs. Discusses mechanism of dissociation, cracking process, Bergius patents, berginization of heavy oils, asphalts, etc., and its application in France.

See also OIL FUEL, Bergius Production Process.

Interfacial Tension between Water and. The Interfacial Tension between Petroleum Products and Water, E. M. Johansen. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 132-135, 2 figs. Study of relations between interfacial tension and number of other subjects.

Italy. Petroliferous Regions in the Latina Valley (I terreni petroliferi della Valle Latina), V. Novarese. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 4, Oct. 15, 1924, pp. 87-95. Discusses Lazio and Campania districts in Latina Valley; geologic formation, tectonics, occurrence of oil, asphalt, characteristics and properties.

The Petroleum Problem in Italy (Intorno al problema del petrolio in Italia), B. Lotti. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 3, Sept. 15, 1924, pp. 57-65. Discusses geologic formation and probable occurrence of oil in various parts of Italy; prospecting, especially on Adriatic; etc.

Japan. Petroleum in Japan, A. T. Coumbe, Jr. Trade Information Bul. (Supp. to Commerce Reports), June 30, 1924, 27 pp. Details of production of crude petroleum, producing fields, estimated reserves; prospecting, concession and production regulations; refining, etc.

Production and Consumption in Japan, C. E. Kern. Oil & Gas Jl., vol. 23, no. 7-A, July 10, 1924, pp. 28 and 133. Details of production of oil, gas and gasoline by Nippon Oil Co.

Japanese, Composition of. On the Composition of Japanese Petroleum, S. Komatsu and S. Kusumoto. Kyoto Imperial Univ., College of Sci.—Memoirs, vol. 7, no. 2, Feb. 1924, pp. 77-84, 1 fig. Composed, for greater part, of hydrocarbons of polymethylene series or naphthene; results of study to isolate polymethylene hydrocarbons in pure condition and to ascertain their constitutions by chemical means.

Kansas Developments. Petroleum Development in Kansas During 1923, J. M. Sands. Am. Inst. Min. & Met. Engrs.—Trans., no. 1325-P, Mar. 1924, 2 pp. Describes important developments in four counties, all of which brought in 40-deg. oil.

Kerogen. Kerogen and Its Relation to the Origin of Oil, E. A. Trager. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 3, May-June 1924, pp. 301-311, 18 figs. Kerogen is defined as "neither petroleum, bitumen, nor resin, but yielding petroleum and ammonium compounds on distillation." Results of studies based on destructive distillation, compression and microscopic study of shales containing kerogen.

Marketing. Marketing Crude Petroleum, L. M. Fanning. Eng. & Min. Jl.-Press, vol. 118, no. 6, Aug. 9, 1924, pp. 209-213. Account of how business is conducted from well to refinery.

New Mexico. The Petroleum Situation in New Mexico, C. T. Kirk and E. G. Woodruff. Oil Trade Jl., vol. 15, no. 8, Aug. 1924, pp. 30-34, 52 and 54, 1 fig. Gives general information on geology and petroleum possibilities of New Mexico; generalized tabulation of geological formations.

Nickel in. The Significance of Nickel in Petroleum, W. Ramsay. Instn. Petroleum Technologists—Jl., vol. 10, no. 41, Feb. 1924, pp. 87-91. Considers theories on nature and origin of petroleum; table giving nickel content of a number of authentic petroleums and some associated bodies expressed as parts per million.

Nickel and Vanadium in. The Occurrence of Vanadium and Nickel in Petroleum, E. DeGolyer. Economic Geology, vol. 19, no. 6, Sept.-Oct. 1924, pp. 550-555 and (discussion) 555-558. Points out that common occurrence of nickel in petroleum of widely different chemical types and geographic sources suggests that its presence may have important bearing on origin even from organic material.

Oklahoma. The Tonkawa Field, Oklahoma, G. C. Clark and F. L. Aurin. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 3, May-June 1924, pp. 269-283, 7 figs. Discusses location of Tonkawa field, history and development, surface and subsurface stratigraphy, possibilities for deeper production.

The Tonkawa Oil and Gas Field, Oklahoma, J. F. Hosterman. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 3, May-June 1924, pp. 284-300, 3 figs. Discusses location, stratigraphy, structure, drilling systems, casing problems, pipe lines, development of deeper sand.

Oregon. Petroleum Possibilities of Western Oregon, W. DuPre Smith. Economic Geology, vol. 19, no. 5, Aug. 1924, pp. 455-465, 1 fig. Discusses history of drilling operations, gives tentative table of stratigraphy of western Oregon; details of prospective fields; concludes that western Oregon is territory of possible but not probable petroleum reserve.

Origin. Notes on the Origin of Petroleum, F. M. Van Tuyl. Colo. School of Mines—Alumni Mag., vol. 14, no. 1, May 1924, pp. 8-12. Prevalent theories of origin; inorganic and organic theories.

Petroleum and Natural Gas, L. J. Jones. Petroleum Times, vol. 11, nos. 271, 272, and 273, Mar. 15, 22, and 29, 1924, pp. 389-390, 423-424, and 461-463. Origin, occurrence, prospecting, and drilling.

Packing and Shipping. Packing and Shipping Oil and Lubricants, J. B. Edwards. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 59-64, 10 figs. Methods in use at Tide Water Oil Co., Bayonne, N. J.

Panama. Oil Possibilities of Panama, J. F. Sheridan. Eng. & Min. Jl.-Press, vol. 117, no. 14, Apr. 5, 1924, pp. 565-567, 1 fig. Review of recent activity of independent producers.

Paraffin and Mazouts. On the Properties and Structure of Groznyi Paraffinic Petroleums and Mazuts, B. C. Tycinin. Petroleum & Oil Shale Industry (Russian), vol. 6, nos. 5-6, 1924, pp. 838-853, 2 figs. Importance of solidification curves for valuation of paraffinic fuel; principles of thermic deparaffination; some technical qualities of paraffin wax obtained by thermic treatment; mode of formation of ozokerite deposits and temperature of paraffinic petroleum. (In Russian, with abstract in English).

On the Structure and Some Properties of Groznyi Paraffinic Petroleums and Mazouts (Residuum Oils), B. G. Tycinin. Petroleum & Oil-Shale Industry, vol. 5, no. 11-12, Nov.-Dec. 1923, pp. 620-631, 24 figs. on supp. plates. Part I:

Fundamental view concerning forms of occurrence of paraffin in petroleums; object and method of investigation. Part II: Method of determining maximum solidification temperature and structure of paraffinic mazout. Part III: Dissolvents and precipitants. (In Russian, with abstract in English, pp. 634-635.)

Paraffin Wax Extraction. Experimental Paraffin Wax Extraction From Groznyi Petroleum on an Industrial Scale, I. Elin. Petroleum & Oil-Shalc Industry, vol. 6, no. 3, 1924, pp. 462-468. (In Russian.)

Peat, Recovery from. See PEAT, Oil and Coke Recovery.

Persia. The Geology and Oil Measures of South-West Persia, R. K. Richardson. Instn. Petroleum Technologists—Jl., vol. 10, no. 43, June 1924, pp. 256-284 and (discussion) 284-296, 33 figs. Discusses topographical features, stratigraphy, correlation, Palæontology, geology and tectonics, origin of oil, Maidan-I-Naftun oilfield.

Peru and Ecuador. Petroleum Industry and Trade of Peru and Ecuador, W. W. Dobkin. Trade Information Bul. (Supp. to Commerce Repts.), no. 175, Jan. 21, 1924, 26 pp. History of fields; details of producing fields; production of crude petroleum; petroleum companies; laws in connection with concessions; refineries; market; etc.

Pipe Lines. Transportation of Petroleum (Trasporte de Petroleo), E. E. Bachofen. Ingenieria, vol. 28, no. 8, Aug. 1924, pp. 344-348. Calculation and construction of pipe lines.

See also PIPE LINES, Oil.

Production. Petroleum in 1922, G. B. Richardson. U. S. Geol. Survey, no. II:32, July 15, 1924, pp. 359-438, 15 figs. Statistics of production and consumption, mainly in U. S. A.

Production, Alsace. Petroleum Production in France. Petroleum World, vol. 21, no. 280, Jan. 1924, pp. 17-18. History of Alsatian production; geology; exploitation by shafts and galleries at Pechelbronn mines.

Production Cost. The Production Cost of Petroleum, M. E. Kopcinsky. Petroleum & Oil-Shale Industry, vol. 5, no. 7-8, July-Aug. 1923, pp. 19-21. (In Russian.) See also Remarks on Above Article, by V. I. Frolow, pp. 21-23.

Production, Europe. Present Oil Production in Europe. Oil & Gas Jl., vol. 23, no. 30, Dec. 18, 1924, pp. 78D and 196. Summary of operations and prospects in fields of Rumania, Czecho-Slovakia, Hungary, Austria, Jugoslavia, Germany, Poland, and France.

Production from Coal. Oil Production from Australian Coal and Shale. Indus. Australian & Min. Standard, vol. 71, nos. 1845 and 1846, Apr. 17 and 24, 1924, pp. 580-581 and 617. National importance of finding ways to produce petrol and oils from coal and shale. Indicates some of the difficulties to be faced and suggests lines along which solutions may be found. Progress of discovery in this field during past few years, with special reference to Australian conditions.

The Director of Fuel Research on Oil and Coke Production from Coal, C. H. Lander. Gas. Wld., vol. 81, no. 2086, July 12, 1924, pp. 8-10 (annual coal supp.). Discusses yield and quality of oil, market for coke, and ammonia yield. Extract of paper read before World Power Conference.

The Production of Oil From Coal, H. G. Shatwell. Colliery Engr., vol. 1, no. 1, Mar. 1924, pp. 7-10, 1 fig. Description of work of Bergius on liquefaction of coal.

Production, Gas in. The Function of Gas in Oil Production. Petroleum Times, vol. 11, no. 277, Apr. 26, 1924, pp. 603-604. Methods employed, either to substitute action of natural gas in oil fields or to reinforce its action when its pressure has become feeble.

Production Methods, California. Petroleum Production Methods in Southern California, G. P. Chaplin. Min. Mag., vol. 31, nos. 4 and 5, Oct. and Nov. 1924, pp. 218-224 and 265-275, 20 figs. Particulars of petroleum production from flowing wells and description of pumping wells, including discussion of well-tubing and pumping components; details of pumping jacks, power for pumping, pulling, etc., and of other forms of pumps.

Production Statistics. Huge Overproduction Is Chief Feature of 1923 Petroleum Business, Jos. E. Pogue. Automotive Industries, vol. 50, no. 4, Jan. 24, 1924, pp. 169-174, 8 figs. Eight flush pools, reaching individual peaks exceeding 100,000 bbl. per day, brought in during year; progress in drilling methods.

Production Statistics of the Petroleum Industry. Oil Eng. & Finance, vol. 5, no. 97, May 1924, pp. 274-277. Figures and notes on production of the various countries.

Production, Swabbing Method. Swabbing, A. Millar. Instn. Petroleum Technologists—Jl., vol. 10, no. 41, Feb. 1924, pp. 105-108 and (discussion) 108-110. Discusses swabbing method of raising oil from wells, giving practical hints.

Progress Survey. Survey of Petroleum Progress. Min. & Metallurgy, vol. 5, no. 207, Mar. 1924, pp. 132-137, 7 figs. Abstracts from symposium as follows: Alamo Pool, Mexico; World's Oil Production; Vanadium in Petroleum, E. S. Porter; Persia, E. DeGolyer; Argentine Development in 1923, C. W. Washburne; Settling Boxes for Rotary Mud, A. Knapp; Smith Pool, Seminole, County, Okla., S. Powers; Research in Microfaunas; Cromwell Pool Seminole County, Okla., S. Powers; Removal of Paraffin from Oil Wells.

Prospecting for. Coal as an Aid in Oil Exploration, E. R. Lilley. Eng. & Min. Jl.-Press, vol. 117, no. 25, June 21, 1924, pp. 1009-1012, 3 figs. Its character in a given locality may serve as an indication of presence or absence of petroleum.

Oil Prospecting. Queensland Govt. Min. Jl., vol. 25, no. 293, Oct. 1924. Containing following reports by L. C. Ball: Report on Oil Prospecting, near Tewantin, pp. 354-360, 8 figs; Report on the Oil Bores on Laguna Beach, near Tewantin, pp. 361-362; Report on Oil Prospecting at Beaudesert, pp. 362-364, 1 fig.

Oil Prospecting and the Argentine Mining Law, L. Sol. Oil Eng. & Finance, vol. 5, no. 93, Jan. 5, 1924, pp. 11-12. Its drawbacks and possibilities.

Prospecting for Petroleum in Australia, E. C. Andrews. Economic Geology, vol. 19, no. 2, Mar. 1924, pp. 157-168, 1 fig. History of prospecting and results in individual states; geological structure of Australia, and of commercial oil fields in neighborhood of Australia.

Some Planetable Methods, W. A. English. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 1, Jan.-Feb. 1924, pp. 47-54, 3 figs. Use of sighting points offset from planetable stations; preparation of correction table for use with gradienter; use of target rod for stadia measurements.

Theory and Science in Oil-Finding, G. M. Edwards. Oil Eng. & Finance, vol. 5, no. 93, Jan. 5, 1924, pp. 19-20. Points out that individuality of geologist is important factor; oil finder of future.

Pumps. See OIL PUMPS.

Recooling. Modern Plants for Recobling of Oil (Neuzeitliche Oelrückkühlanlagen), G. Spettmann. Praktische Maschinen-Konstrukteur, vol. 57, no. 41, Oct. 28, 1924, pp. 554-555. Details of Zimmerman system for cooling oil used in hardening or cooling, by being made to flow along outside of pipes in which cooling water circulates in opposite direction.

Recovery. Tube Section Treating Plant Cuts

Oil Recovery Costs 6 Cents a Barrel, P. Wagner. Nat. Petroleum News, vol. 16, no. 30, July 23, 1924, pp. 71-72, 3 figs. Tube section treating installation of Humble Oil & Refg. Co. consists of four tube sections, 3 ft. long, and three plain sections, 5 ft. long; gives records of results.

Refining. California Development in the Preparation and Use of Adsorptive Clays in Refining, C. J. von Bibra. Petroleum Wld., vol. 21, no. 288, Sept. 1924, pp. 359-364. Discusses theory of adsorption, developments, treated clays, clay treating methods, recovery of spent clay and economic aspects.

Doherty Gets Patent on Radically New Refining Method. Nat. Petroleum News, vol. 16, no. 4, Jan. 23, 1924, pp. 37-38 and 41-43, 5 figs. Invention comprises method of distilling petroleum oils, such as crude petroleum, wherein petroleum is distilled in plurality of stages at different temperatures; and process in which gaseous heat carried is used as assistant in distillation to aid in volatilizing fractions desired; also comprises method of distillation wherein temperatures are carried high enough to secure more or less cracking of oil.

Petroleum and Petroleum Refining, A. M. O'Brien. S. Wales Inst. Engrs.—Proc., vol. 39, no. 6, Feb. 2, 1924, pp. 729-751 and (discussion) 751-756, 11 figs. Brief description of winning of petroleum, and its transportation to refinery; method of distillation; refining; treatments.

Petroleum Refinery Statistics for 1923 (for United States), W. C. Hill. U. S. Bur. Mines, Feb. 1924, 31 pp., 4 charts. Runs to stills and output of refineries; stocks at refineries; gasoline, kerosene, gas and fuel oils, and lubricants statistics.

Refinery Heat Losses And Insulation—Stills and Settings, H. S. Bell. Nat. Petroleum News. vol. 16, nos. 13 and 14, Mar. 26 and Apr. 2, 1924, pp. 62-64, and 93 and 95-97, 3 figs. Sources of heat losses in refineries from lack of proper insulation, including losses from still and boiler surfaces and settings, steam and hot oil lines, tanks whose contents must be heated to permit them to be pumped, filter house, and wax plant.

Refining Petroleum by Sulphuric Acid Absorbed by Capillary-Active Substances (Ueber die Raffination mit kapillar aufgesaugter Schwefelsäure), F. Schulz. Petroleum, vol. 20, no. 9, Mar. 20, 1924, pp. 317-320. Removal of colloidal substances causing high color and turbidity by sulphuric acid in petroleum refining is said to be principally physical process, accompanied by subordinate chemical reactions; from colorimetric data curve may be drawn analogous to adsorption curve; acid refining is favored by low temperature; portion of sulphuric acid used in treating oil remains in colloidal solution in oil.

Simplification and Cheapening of Vacuum Oil Plants (Neue Mittel zur Vereinfachung und Verbilligung von Vacuum-Oelanlagen), K. Kahn. Petroleum, vol. 20, no. 31, Nov. 1, 1924, pp. 1689-1695, 6 figs. Details of new apparatus, dispensing with condenser, and comparative cost data showing large savings.

The Refining of Petroleum with Liquefied Sulphurous Acid (Die Raffination des Erdöles mit verflüssigter schwefliger Säure), L. Edeleanu. Petroleum, vol. 19, no. 34, Dec. 1, 1923, pp. 1195-1207, 3 figs. Describes method of treating hydrocarbons which is being extensively used in petroleum and lignite industry, and which has led to production of high-grade oils from asphalt-rich sulphurous and other low-grade crude oils, to recovery of temperature-proof lubricating oils, and to separation of hard and soft paraffins from lignite tar.

The Rôle of Adsorption in Petroleum Refining, H. L. Kauffman. Chem. & Met. Eng., vol. 30, no. 4, Jan. 28, 1924, pp. 153-156, 2 figs. How Fullers' earth and similar adsorbents make possible commercial purification and bleaching of gasoline, kerosene, and lubricating oils.

The Use of Bauxite in Petroleum Refining. Petroleum Times, vol. 12, no. 287, July 5, 1924, pp. 17-18. Bauxite is colloidal adsorptive of first order for organic sulphur derivatives; freshly ignited bauxite gives best results; bauxite per se is complete and sufficient refining agent for kerosene; other sulphurous distillates are also capable of purification by bauxite.

Use of Aluminum Chloride for Petroleum Refining, I. N. Strigeoff. Petroleum & Oil-Shale Industry, vol. 5, no. 9, Sept. 1923, pp. 246-250. (In Russian.)

World Survey of Petroleum Refining, C. E. Bowles. Oil & Gas Jl., vol. 23, no. 30, Dec. 18, 1924, pp. 82-83, 150B and 150D. Capacity far in excess of present production of crude oil and of existing consumption of oil products. Coming demand.

Russian Far East. Petroleum in the Russian Far East, P. I. Polevoj. Petroleum & Oil-Shale Industry (Russian), vol. 6, no. 3, 1924, pp. 449-457. Discusses petroleum in following three areas, eastern shore of lake Baikal, island Sachalin, and Kamcâtka peninsula. (In Russian).

Shales. See OIL SHALES.

Statistics, United States. Statistical Tables Relative to Petroleum. Am. Petroleum Inst.—Bul., vol. 5, no. 20, Apr. 7, 1924, 15 pp. Statistical tables relative to production and consumption; annual rate of excess of consumption or production in United States, California, and East of Rockies; export and domestic consumption; production of crude oil and well completion; oil imports into United States; crude-oil stocks and refined products; production, stocks, exports and domestic consumption of gasoline, kerosene, gas and fuel oils, and of lubricating oil.

Still Equipment on Railway Cars. Oil Still Equipment on Railroad Cars. Iron Age, vol. 113, no. 20, May 15, 1924, pp. 1439-1440, 2 figs. Portable plant with capacity up to 3500 bbl. a day useful for opening new fields; compactness and economical operation are features.

Still Tubes, Calorizing of. Comparative Advantages of Calorizing, A. H. Mayo. Oil & Gas Jl., vol. 23, no. 13, Feb. 28, 1924, pp. 96 and 100, 2 figs. Describes experience of Waverly Oil Works Co., Pittsburgh, Pa., with use of calorizing for tubes in pressure stills, and summarizes results and savings.

Storage. See OIL FUEL, Locomotive; OIL TANKS.

Sulphur Compounds. Action of Petroleum-Refining Agents on Pure Organic Sulfur Compounds Dissolved in Naphtha, A. E. Wood, A. Lowy and W. F. Faragher. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1116-1120. Results of investigation.

Sulphur in. The Distribution of Sulphur in Crude Petroleum, N. A. C. Smith and D. D. Stark. U. S. Bur. Mines—Reports of Investigations, no. 2582, Mar. 1924, 17 pp., 3 figs. on supp. plates. Occurrences of sulphur-bearing crudes. Study of distribution of sulphur in the various products obtained from light Mexican crude. New method of separating asphaltic crudes into oil and asphalt. Effect of asphalt removal on sulphur distribution.

Sulphur in, Determination of. The Determination of Sulphur in Petroleum and Its Distillation Products, B. N. Tiutiunnikov. Petroleum & Oil-Shale Industry, vol. 5, no. 10, Oct. 1923, pp. 489-491. Method developed by author giving results which compare favorably with those obtained by

other methods. (In Russian, with brief abstract in English.)

Sweetening. The Chemistry of "Sweetening" in the Petroleum Industry, G. L. Wendt and S. H. Diggs. Indus. & Eng. Chem., vol 16, no. 11, Nov. 1924, pp. 1113-1115. Shows that sweetening consists in removal of hydrogen sulphide and of alkyl mercaptans which are only compounds responsible for sourness.

Synthetic. Synthetic Petroleum (Il petrolio sintetico), L. Dal Prato. Industria, vol. 38, no. 21, Nov. 15, 1924, pp. 578-585. Production of illuminating gas, water gas, hydrogen, and methane; syntheses of petroleum hydrocarbons; conversion and polymerization of methane, ethylene, and acetylene; hydrogenation of acetylene and carbon, and their conversion to liquid hydrocarbons; conversion of carbon and methane into liquid fuels; Olivier and Burgeois synthetic process.

Synthetic Petroleum by the Voltaic Arc (Le Pétrole synthetique par l'Arc voltaïque), P. Marval. Electricien, vol. 55, no. 1358, Oct. 15, 1924, pp. 465-468, 3 figs. Details of new process for manufacturing synthetic petroleum, starting from lignite.

Testing. Testing and Care of Refined Oils. Oil & Gas Jl., vol. 23, no. 14, Mar. 6, 1924, pp. 94 and 132-133. Close check necessary during process of manufacture and until products are put into tank cars ready for shipment.

Viscosity. The Viscosity of Oils at High Temperatures, A. R. Fortsch and Rob. E. Wilson. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 789-792, 3 figs. Data and curves covering viscosity determinations on wide variety of oils from Mid-continental and similar crudes up to temperature of 495 deg. fahr.; outline of method of interpolation.

Viscosity-Temperature Curves. Viscosity-Temperature Curves of Fractions of Typical American Crude Oils, F. W. Lane and E. W. Dean. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 905-911, 6 figs. Results of investigation made by Bur. of Mines; discusses method of rectifying temperature-viscosity curves, and possibility of its practical utilization.

Weights and Measures, Conversion of. Conversion of Petroleum Weights and Measure, G. Sell. Instn. Petroleum Technologists—Jl., vol. 10, no. 46, Nov. 1924, pp. 821-824, 1 fig. Notes on conversion of weights to measures and vice versa, and consideration of a quick and yet reliable method of carrying out such conversions.

Wells. See OIL WELLS.

World-War Problems. Petroleum Problems of the World War, P. Foley. U. S. Nav. Inst.—Proc., vol. 50, no. 261, Nov. 1924, pp. 1802-1832. Study in practical logistics. Bunkering problem of Brit. Grand Fleet; British and French armies in France; American Expeditionary Force; Italy; Far-Eastern agreement; war problems of American petroleum industry; post-armistice adjustments.

OIL ENGINES

Airless-Injection. See Solid-Injection; Heavy-Oil.

Automobile. See AUTOMOBILE ENGINES, Bagnulo.

Beardmore - Speedwell. See MOTORSHIPS, Power Plants.

Bearing Adjustments. Marine Oil Engines, J. Lamb. Inst. Mar. Engrs.—Trans., vol. 36, Oct. 1924, pp. 378-388 and (discussion) 388-393, 2 figs. and vol. 36, Nov. 1924, pp. 472-476. Practical notes on bearing adjustments.

Bearings for. See BEARINGS, Oil-Engine.

Bethlehem. The Bethlehem Steel Company's New Oil Engine. Shipbldg. & Shipg. Rec., vol. 23, no. 10, Mar. 6, 1924, pp. 275-282, 16 figs. See also Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 161-167, 15 figs. Detailed description of vertical 2-cycle single-acting oil engine, claimed to be first oil engine of all-American design; constructed in units of four, six, or eight cylinders, running at a speed of from 161 r.p.m. for land power and twin-screw marine purpose down to 90 r.p.m. for single-screw marine use. Description of engine as installed on motorship Cubore.

Brayton-Cycle. The Brayton Cycle for Oil Engine Work. Oil Engine Power, vol. 2, no. 10, Oct. 1924, pp. 547-548, 3 figs. In engine which has given favorable indications on test block, air is introduced into working cylinder from receiver at constant pressure while spray of fuel burns in air current; 2-stage precompressor incorporated in engine keeps receiver charged.

Brotherhood-Still. The Brotherhood-Still Heavy Oil Engine. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 128-130, 5 figs. Model of Still engine suited to stationary conditions.

Central-Station Service. See CENTRAL STATIONS, Diesel-Engined.

Cold-Starting. A Cold-starting Oil Engine. Engineer, vol. 137, no. 3555, Feb. 15, 1924, pp. 180-181, 9 figs. New vertical oil engines made by Ruston & Hornsby, Lincoln, England, of 4-cycle, mechanical-injection, high-compression type, which can be started when quite cold without use of blow lamp or any other heating device.

300 B. H. P. Heavy Oil Engine. Engineering, vol. 118, no. 3071, Nov. 7, 1924, pp. 638-640, 8 figs. Describes horizontal cold-starting oil engine shown by Blackstone & Co. at British Empire Exhibition.

Combustion in. See GAS ENGINES, Combustion in.

Developments. Recent Developments in Oil-Engine Practice, J. T. Godfrey and K. W. Merrylees. Roy. Engrs. Jl., vol. 38, no. 1, Mar. 1924, pp. 28-32, 2 figs. Developments in Diesel and semi-Diesel, or heavy-oil engine.

Diesel. See DIESEL ENGINES.

Double-Acting. A Sliding Cylinder Two-cycle Double-acting Marine Oil Engine. Engineer, vol. 137, nos. 3565 and 3566, Apr. 25 and May 2, 1924, pp. 451-452, 4 figs. and 483-485, 6 figs. Design and performance of 2000-b.hp. engine built at North Brit. Diesel Engine Works, Glasgow.

Dredges with. See DREDGES, Oil-Engined.

Exhaust-Gas Boilers for. See BOILERS, Exhaust-Gas.

Exhaust-Gas Utilization. Putting the Exhaust to Work. Oil Engine Power, vol. 2, no. 11, Nov. 1924, pp. 573-579, 10 figs. Considerations concerning quantity of heat recoverable at various loads and amount of heating surface required.

Falk. Further Development of the Falk Geared Oil-Engine. Motorship, vol. 9, no. 10, Oct. 1924, pp. 734-736, 4 figs. Notes on Falk 2200-s.hp. reduction geared oil-engine propulsion unit to which super-charging has been successfully adapted. Enables mean-effective pressure to be raised to 154 lb. per sq. in. without slightest sign of ill effect. Temperatures are kept down low even with uncooled pistons.

Farm. See FARM MACHINERY, Gas and Oil Engines.

Foos. See Solid-Injection.

Fraser & Chalmers. See Heavy-Oil; Powerplant.

Fuels, Specifications for. Standard Specifications for Oil Engine Fuels. Motorship, vol. 9, no.

7, July 1924, pp. 506-508, 3 figs. Compilation of replies to communication addressed by "Motorship" to representatives of marine and stationary oil-engine industry to users of engines and oil companies on possibility of recommending uniform specifications for oil-engine fuels.

Fullagar Land. The Fullagar Oil Engine for Land Purposes. World Power, vol. 1, no. 5, May 1924, pp. 305-309, 6 figs. Design and features of engine constructed by English Elec. Co.

Gardner. See Heavy-Oil.

Germania. The Development of Germania Large Oil Engines (Die Entwicklung der Germania-Grossölmaschine), W. Laudahn. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 45 and 46, Nov. 8 and 15, 1924, pp. 1171-1176 and 1200-1204, 30 figs. Details of large marine engine built by Fried. Krupp Germania Works in Kiel-Gaarden, with special regard to cylinder construction; traces development from one-cylinder experimental engine of 1911; results of experiments.

Heavy-Oil. Evolution of the Heavy-Oil Engine (L'évolution des moteurs à huiles lourdes), R.-E. Mathot. Société des Ingénieurs Civils de France —Mémoires et Compte Rendu des Aravaux, vol. 77, no. 1-2-3, Jan.-Mar. 1924, pp. 143-181, 20 figs. Discusses properties of fuel oils, Diesel-type engines, explosion engines, and their design and construction.

Gardner Heavy-Oil Engines. Engineering, vol. 118, no. 3069, Oct. 24, 1924, pp. 595-598, 37 figs. Details of engines of hot-bulb type exhibited at British Empire Exhibition.

Report on Heavy-Oil Engine Working Costs (1922-23). Diesel Engine Users Assn., Report submitted to meeting of Feb. 15, 1924, 20 pp., 2 figs. Deals only with cost of running and maintaining engines and their auxiliaries.

The Fraser and Chalmers Heavy Oil Engine. Engineering, vol. 117, no. 3049, June 6, 1924, pp. 731-734, 10 figs. Totally enclosed forced-lubrication vertical engine working on 4-stroke cycle with compressed-air injection; test results.

The Lubrication of Heavy-Oil Engines, C. S. Darling. Mech. Wld., vol. 75, no. 1944, Apr. 4, 1924, pp. 209-210. Deals with lubrication of pistons, cylinders, air compressors, etc., including discussion on oils.

The Polar Heavy Oil Engine. Engineer, vol. 138, no. 3597, Dec. 5, 1924, p. 648, 3 figs. Details of airless-injection engine exhibited at Gothenburg Exhibition by Atlas Diesel Co., of Stockholm; runs on 2-stroke cycle and crank-chamber compression is employed.

High-Compression. High Compression Oil Engines in Theory and Practice. Power Engr., vol. 19, nos. 214, and 215, Jan. and Feb. 1924, pp. 13-15 and 49-51, 6 figs. Jan.: Recent designs and new developments that may be expected. Feb.: Practical matters affecting erection and operation.

Hvid-Type. American Oil Engines on French Barge Canals. Motorship, vol. 9, no. 8, Aug. 1924, pp. 587-589, 5 figs. Concerning numerous 14 b.hp. Bates & Edmonds Hvid-type oil engines, with description of method of working and installation in French canal craft having propeller mounted on rudder.

Hydraulic Couplings. Marine Oil Engine Gearing. Times Trade & Eng. Supp., vol. 13, no. 284, Dec. 15, 1923, p. 342, 1 fig. Describes system advocated by Vulcan Works, Hamburg, of interposing hydraulic coupling between engine and tooth reduction gearing.

Ice Plants. See ICE PLANTS, Oil-Engine-Driven.

Ignition. See IGNITION, Gas and Oil Engines.

Light-Oil Types. High-Speed Petrol and Paraffin Engines, J. Okill. Serial article in Gas & Oil Power, vols. 19 and 20, nos. 220-229, Jan. 3-Oct. 2, 1924, 20 figs. Features and management of the lighter-fuel types of oil engine.

Lubrication. The Two-Cycle Oil Engine. Lubrication, vol. 10, no. 11, Nov. 1924, pp. 133-144, 23 figs. Its lubrication and operation.

See also Heavy-Oil.

Marine. A New Type of Neptune Marine Oil Engine. Mar. Engr. & Nav. Architect, vol. 47, no. 556, Jan. 1924, pp. 5-8, 5 figs. Details of "B" type; special cylinder design; scavenge and bilge pumps lever-driven off crossheads; fuel valve lift control.

America's Newest Workboat Engine. Motorship, vol. 9, no. 2, Feb. 1924, pp. 113-115, 5 figs. Describes 70-b.hp. 4-cylinder Standard marine oil engine.

Building Two-Stroke Cycle Marine Engines, Wm. Eversley. Can. Machy., vol. 32, no. 23, Dec. 4, 1924, pp. 27-29 and 47, 6 figs. Product of St. Lawrence Engine Co., Brockville, Ont., water-cooled throughout, including exhaust manifold; liberal use of jigs important factor in plant's output.

Motor Ships and Marine Oil Engines in 1923. Engineer, vol. 137, no. 3549, Jan. 4, 1924, pp. 7-10, 5 figs. partly on supp. plate. Statistics of production and brief descriptions of most important types of oil engines.

Some Aspects of the Large Marine Oil Engine, C. J. Hawkes. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper no. 2725S, for meeting Apr. 4, 1924, 15 pp., 3 figs. Deals with questions related to cycle temperatures.

10-H.P. Four-Cylinder Marine Motor. Engineering, vol. 118, no. 3076, Dec. 12, 1924, p. 815, 3 figs. Details of marine engine constructed by J. W. Brooke & Co., Lowestoft, Eng.

The Utilisation of Waste Heat in Marine Oil Engines. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, pp. 111-114, 6 figs. Theoretical possibilities.

See also Bethlehem; Double-Acting; Falk; Palmer; Scott-Still.

Nickel Applied to Parts. Nickel and Its Alloys Applied to Oil Engine Parts. Motorship, vol. 9, no. 5, May 1924, pp. 361-363, 8 figs. Cast iron is improved by addition of from 3 to 5 percent of nickel and monel metal reduces maintenance on valves.

Operating Costs. See Heavy-Oil.

Palmer. The New Palmer Oil Engine. Shipbuilder, vol. 30, no. 164, Apr. 1923, pp. 285-286, 1 fig. Particulars of engine intended for British Tanker Co.'s oil-carrying ship British Aviator; 6-cylinder opposed-piston type working on two-stroke cycle and having a diagonal rod coupling system between top and bottom pistons of adjacent cylinders, giving a double-acting action in reference to each individual crank-pin; 3000 b.hp. at 90 r.p.m.

Parts, Machining. See MACHINING METHODS, Vertical-Oil-Engine Parts.

Petter. See Two-Stroke.

Polar. See Heavy-Oil.

Power-Plant. Types of Modern Power Plant Oil Engine. Oil Engine Power, vol. 2, nos. 8 and 10, Aug. and Oct., 1924, pp. 419-422 and 529-531, 8 figs. Aug.: Savings due to elimination of air compressor and of geared camshaft drive have been applied to improvements in general features of design; chain which is used in place of timing gears has big factor of safety against wear. Oct.: Engine developed at Fraser & Chalmers works of Gen. Elec. Co., Erith, England.

Richards Hot-Bulb. See Roller-Bearing.

Rock-Crushing Plant. Fuel Tests of Rock Crushing Plants. Ry. Rev., vol. 74, no. 18, May 3, 1924, pp. 805-807, 4 figs. Two modern installations of So. Pac. Co. tested to determine economy of oil engines; description of power equipment; oil engines were selected on account of low fuel cost and later a series of tests were conducted to determine in what measure object was realized.

Scavenging, Uniflow-Valve. Uniflow Valve Scavenging of Two-Stroke-Cycle Engines, R. Matthews. Power, vol. 59, no. 59, Feb. 5, 1924, pp. 208-209, 4 figs. Obtaining air and fuel mixing; solid injection for high speeds; external mixing.

Scott-Still. The Scott-Still Marine Engine. Diesel Engine Users Assn.—Advance Paper no. 38, for meeting Mar. 14, 1924, 3 pp., 2 figs. Report on 1250-hp. engine at Scotts' Shipbldg. & Engrg. Co., Greenock, for M. S. Dolius.

The Type of Still Engine Required for Marine Service with Special Reference to the Scott-Still Engine, W. J. Still. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper no. 2698S, for meeting, Feb. 15, 1924, 25 pp., 17 figs. Discusses use of high-combustion m.e.p.'s and consequent production of excessive heat stresses in cylinder walls; fuel-injection troubles; insufficient ignition temperatures; water-circulation troubles; want of cylinder lubrication and wear of liners; bearing troubles.

Semi-Diesel. See SEMI-DIESEL ENGINES.

Solid-Injection. Features of Airless Injection Oil Engines, H. F. Birnie and R. C. Baumann. Power Plant Eng., vol. 28, nos. 14, 20, 22, and 24, July 15, Oct. 15, Nov. 15, and Dec. 15, 1924, pp. 751-754, 6 figs; 1056-1058, 6 figs.; 1143-1147, 9 figs.; and 1251-1254, 7 figs. July 15: Advantages and disadvantages of solid injection; types of spray valves used. Oct. 15: Valves of De La Vergne engine. Nov. 15: Scott-Still combination steam and oil engine, illustrating use of differential fuel valves. Dec. 15: Fuel-oil distribution in combustion chamber and directed turbulence are features of Hesselman's system.

Observations on the Solid-Injection Engine, P. H. Schweitzer. Power, vol. 59, no. 3, Jan. 15, 1924, pp. 90-91. Writer believes a flatter combustion line would be desirable, provided it would not lead to after-burning; better control of fuel injection as to spray action and accurate delivery in quantity and timing might lead to this end.

Standardizing Airless-Injection Engines. Motorship, vol. 9, no. 4, Apr. 1924, pp. 270-271, 2 figs. Standardization by Vickers, Ltd., of their 600-b.hp. mercantile 4-stroke oil engine.

The Solid-Injection Oil Engine, H. F. Shepherd. Mech. Eng., vol. 46, no. 5, May 1924, pp. 251-257 and (discussion) 257-258 and 278, 30 figs. Presents most pertinent facts on development of engine from former hot-surface unit and points out influence of combustion-chamber design, spray angle and velocity, atomization, detonation, and other problems confronting oil-engine designer.

Types of Modern Power-Plant Oil Engines. Oil Engine Power, vol. 2, no. 11, Nov. 1924, pp. 583-587, 6 figs. New Foos design for units of from 30 to 400 b.hp. is characterized by smooth exterior appearance and enclosure of most of cylinder head within framing; adoption of airless-injection system permits burning some of heaviest fuels at high economy.

Types of Modern Power-Plant Oil Engines. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 386-388, 2 figs. Bessemer Gas Engine Co., Grove City, have joined with Atlas-Imperial Engine Co., Oakland, Cal., in manufacture of airless-injection oil engines by acquiring Eastern manufacturing rights. Gives table showing how oil engine effects savings in comparison with every other type of heat prime mover.

Stationary. Stationary Oil Engines at the British Empire Exhibition. Oil Engine Power, vol. 2, no. 7, July 1924, pp. 374-377, 5 figs. Discusses oil engines exhibited at British Empire Exhibition at Wembley, including airless-injection engines, both of surface-ignition and high compression kind.

Surface-Ignition. Types of Modern Power-Plant Oil Engines. Oil Engine Power, vol. 2, no. 5, May 1924, pp. 271-272, 3 figs. New model of Italian surface-ignition engine has crosshead and main oiling system entirely separated from cylinder bore, arrangement which results in low lubricating-oil consumption; Corliss-type valve controls admission of scavenging air, amount of which is regulated by governor.

Torsiograms of. Torsiograms and Vibrograms of Oil Engines. Motorship, vol. 9, no. 1, Jan. 1924, pp. 28-31, 45 figs. Simple instruments facilitate exploration of machinery for critical periodic stresses.

Two-Stroke. Petter Two-Stroke Oil Engines. Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 720-722, 4 figs. Describes two examples, the 5-b.hp. paraffin engine, and 36-42-b.hp. crude-oil engine.

Vickers. See Solid-Injection.

Waste-Heat Recovery. See WASTE HEAT, Recovery.

Water-Works. Oil Engines for New York City's Water Supply. Oil Engine Power, vol. 2, no. 8, Aug. 1924, pp. 426-427, 2 figs. Specifications which are being prepared for replacement of steam-driven pumps at Clove Station, Staten Island.

OIL FIELDS

Argentina. The Most Southern Oilfield in the World. Petroleum Wld., vol. 21, no. 285, June 1924, pp. 235-238 and 240-242, 2 figs. Unique features of oilfield of Comodoro Rivadavia in Argentine Republic. Oil possibilities of other areas in Argentina. From "Lamp." See also Petroleum Times, vol. 11, nos. 281 and 282, May 24 and 31, 1924, pp. 725-726 and 767-768.

Arkansas. Smackover Oil Field, Ouachita and Union Counties, Ark., H. G. Schneider. Am. Inst. Min. & Met. Engrs.—Trans., no. 1326-P, Mar. 1924, 24 pp., 3 figs. Stratigraphy; tertiary system; productive sands; relation of oil and gas to structure; causes of accumulation; production; drilling methods; decline and ultimate production of wells.

Bulgaria. The Oil Regions of Bulgaria. Petroleum Times, vol. 12, no. 301, Oct. 11, 1924, pp. 561-562, 3 figs. partly on p. 563. Notes on several important oil regions which years of systematic research has disclosed.

California. A Comparative Study of the San Joaquin Valley Oil Fields, J. B. Stevens. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 1, Jan.-Feb. 1924, pp. 29-40, 3 figs. Geological discussion.

Dynamics of Oil-Field structure in Southern California, R. N. Ferguson and C. G. Willis. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 576-583, 2 figs. Theories developed by authors as result of exploration work carried on largely in Los Angeles Basin, and example of their application to a particular structural problem.

Hovey Hills Area, Midway Oil Field, K. C. Wallace. Min. & Oil Bul., vol. 10, no. 7, July 1924, pp. 705-707 and 758, 1 fig. Gives geology of district and drilling activities.

Huntington Beach Oil Field, Orange County, California, S. H. Gester. Am. Assn. Petroleum

Geologists—Bul., vol. 8, no. 1, Jan.-Feb. 1924, pp. 41-46, 2 figs. Geology, and production data.

New Development Problems and Their Solution in Southern California Oil Fields, J. Jensen and G. D. Robertson. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 2, Mar.-Apr. 1924, pp. 135-151.

Report on the Long Beach Oil Field, J. B. Case and R. L. Keyes. Cal. Oil Fields, vol. 9, no. 4, Oct. 1923, pp. 5-17, 5 maps. Description and history of development of entire field; geology; oil and gas zones; drilling conditions; casing program; water conditions; gas wastage; production.

Report on Southeastern Portion of Thirty-Five Anticline, Sunset Oil Field, Kern County, California. Cal. Oil Fields, vol. 9, no. 5, Nov. 1923, pp. 5-33, 8 figs. Results obtained by recent drilling; shows present status of all wells located in sections mentioned, with special reference to water conditions.

Santa Fe Springs Field, California, R. R. Templeton and C. R. McCollom. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 2, Mar.-Apr. 1924, pp. 178-192 and (discussion) 193-194, 2 figs. History of early development; formations penetrated in drilling; drilling policy and practice; production; water problems; etc.

The Long Beach Oil Field and Its Problems, A. T. Schwennesen, R. M. Overbeck and H. H. Dubendorf. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 4, July-Aug. 1924, pp. 403-423, 7 figs. partly on supp. plate. Geology; oil zones; production problems; history of development; production and decline of wells.

The Minor Oil Fields of Kern County. Cal. Oil Fields, vol. 9, nos. 9 and 10, June and July 1924, pp. 5-29 and 5-22, 12 figs. Includes following reports: June: Devils Den Field, E. Huguenin; Hovey Hills Field, L. W. Saunders; Sunset Extension Field, R. G. Rogers; Wheeler Ridge Field, C. L. Kaiser. July: Lost Hills Oil Field, R. E. McCabe; Belridge and North Belridge Oil Fields, H. Boezinger; Poso Creek Field, C. L. Kaiser.

The Oilfields of the Los Angeles Basin, Southern California, H. B. Milner. Min. Mag., vol. 29, no. 6, Dec. 1923 and vol. 30, no. 1, Jan. 1924, pp. 329-336 and 9-16, 9 figs. Activities and developments at Long Beach, Huntington Beach, and Santa Fe Springs.

Canada. Oil and Gas in Ontario, R. B. Harkness. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 148-156, 1 fig. Early gas fields; oil and gas-bearing formations; structure; general geological features; principles of accumulation; probable points of accumulation in Ontario.

Oil Prospects In Southern Alberta, M. Y. Williams. Can. Min. Jl., vol. 44, no. 48, Nov. 30, 1923, pp. 949-950. Geology, and summary of exploration.

Recent Developments in the Fort Norman Oil Area, G. S. Hume. Can. Min. Jl., vol. 44, no. 48, Nov. 30, 1923, pp. 939-940, 1 fig.

The Fort Norman Oilfields of Canada, G. S. Hume. Petroleum Wld., vol. 21, no. 288, Sept. 1924, pp. 353-357. Gives geology of district where Canada's largest well (2,000 bbl. daily) was brought in.

See also NATURAL GAS, Canada.

China. The Oil Fields of China, T. O. Chu. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 2, Mar.-Apr. 1924, pp. 169-177, 4 figs. Details of Shensi and Szechwan fields; other oil prospects.

Colombia, S. A. Colombia Oil Fields- -1923, L. G. Huntley. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1326-P, Mar. 1924, 5 pp., 1 fig. Points out differences between new, more liberal, law passed by Colombian Congress and law passed in 1919, gives a few facts about pipe-line concession granted to a Canadian company, and tells of new drilling developments.

Oil Production Prospects in the Coastal Belt of Colombia, L. Owen. Oil Eng. & Finance, vol. 5, no. 103, Nov. 1924, pp. 624-627, 1 fig. Geology and structure of district; oil and gas indications; correlations of Colombian tertiary belt with other fields; upper Cretaceous shales.

Colorado. Oil and Gas in Northeastern Colorado. Colo. School of Mines Mag., vol. 14, no. 7, Nov. 1924, pp. 13-18. Prospects of developing new fields.

Core Sampling. Determination of Core Samples in Core Drilling, A. C. Rubel. Petroleum Times, vol. 12, no. 305, Nov. 8, 1924, pp. 731-733, 2 figs. Methods of core barrel sampling; application to rotary drilling.

Dutch East Indies. Oil is Big Asset of Dutch East Indies, N. Van Aken. Oil & Gas Jl., vol. 23, no. 30, Dec. 18, 1924, pp. 138, 150D and 150F, 1 fig. Data on Sumatra, Palembang, Java and Borneo fields, including production and operations; quality of oils; up-to-date equipment used.

Electricity in. Electric Plants for the Roumanian Oil Fields (Les installations électriques des chantiers pétrolifères en Roumanie), Al. Proca. Revue Générale de l'Electricité, vol. 16, no. 22, Nov. 29, 1924, pp. 861-872, 24 figs. Applications of electricity, and requirements of electric motors. Gives examples of plants.

Fire Prevention. Fire Prevention in Oil Properties, F. A. Epps. Oil & Gas Jl., vol. 23, no. 21-A, Oct. 16, 1924, pp. 32 and 120-121. Fundamental conditions which give rise to fires in tanks and stills. Hazards from static electricity and carelessness.

Future Production Possibilities, U. S. What of the Future?, P. Wagner. Nat. Petroleum News, vol. 16, nos. 47, 48, 49, 50, 51, 52, and 53, Nov. 19, 26, Dec. 3, 10, 17, 24, and 31, pp. 63, 66 and 68; 84-86; 55 and 58; 65-67; 83-84 and 86; 75 and 78-80; and 47 and 50. Analysis of oil-production possibilities of known territory in United States. Nov. 26: Oil possibilities of Western Kansas. Dec. 3: Kansas fields. Dec. 10: East Central Oklahoma. Dec. 17: Osage Nation, Okla. Dec. 24: Core drilling to augment new pools in Central North Oklahoma. Dec. 31: Southwestern Oklahoma.

Gulf Coastal Plain. Résumé of the Geology of the Gulf Coastal Plain, J. E. Brantly. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 1, Jan.-Feb. 1924, pp. 21-28. Describes area extending from Florida westward and southward to Rio Grande, and thence southward and southeastward to Yucatan Peninsula in Mexico.

India. Petroleum in North-West India. Petroleum Times, vol. 11, no. 267, Feb. 16, 1924, p. 245. Data on the Khaur field.

Indiana. Conditions And Possibilities Of The Hotmire Oil Field Of Indiana, W. N. Logan. Nat. Petroleum News, vol. 16, no. 8, Feb. 20, 1924, pp. 56 and 58-59, 1 fig. Location, topographic, geological and structural conditions, oil sand, development, casing requirements, and future of field.

Jugoslavia. Oil Conference in Jugoslavia (Die Erdölhöffigkeit Jugoslawiens), L. Waagen. Petroleum, vol. 20, no. 26, Sept. 10, 1924, pp. 1313-1321. Discusses conditions in Croatia and Slavonia, geological formation, analysis of oil, results of drilling.

Mexico. Oil Potentialities of Mexico, Geo. Howell. Oil Eng. & Finance, vol. 5, no. 102, Oct. 1924, pp. 559-561. Mexico's total yield and future; American opinions.

Mining Process. Unique Method of Mining Oil in Texas Gaining Interest of Operators, Lawrence

E. Smith. Nat. Petroleum News, vol. 16, nos. 44 and 45, Oct. 29, and Nov. 5, 1924, p. 33 and 63-65 and 67, 5 figs. Practical operation of Ranney process of mining oil, which is said to be unlike French method employed at Pechelbronn, following it only in preliminary step of sinking a shaft.

Oklahoma. Burbank Field, Osage County, Oklahoma, J. M. Sands. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 584-592, 2 figs. Discusses importance of study of sand conditions of any field and effect of such conditions on concentration and production of oil; and probability that rapid development of a field with subsequent open flow from wells where producing sand is close-grained gives a much larger ultimate production.

Four Horizons Below Mississippi Lime, L. H. White. Oil & Gas Jl., vol. 23, no. 15, Mar. 13, 1924, pp. 42 and 68, 1 fig. Important for oil operator to distinguish them so that he may know what to expect in way of production. Describes sands below Mississippi lime in district from Okmulgee to Pearsonia, Osage County, Oklahoma.

New High Gravity Oil Field in Lincoln County, Oklahoma, D. W. Moore. Oil Trade, vol. 15, no. 11, Nov. 1924, pp. 52 and 54, 1 fig. Development of new well at Davenport.

The Cromwell Pool, Geo. A. Kroenlein. Min & Metallurgy, vol. 5, no. 215, Nov. 1924, pp. 526-530, 2 figs. Location and history of pool which has been outstanding development in Oklahoma during 1924; geology; sand conditions; production conditions; recovery; production costs.

The Graham Field, Oklahoma, C. W. Tomlinson and W. Storm. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 593-620, 10 figs. Location and history; structure; stratigraphy; correlation of Graham Pennsylvanian section with other areas; gravity of oil; ultimate production; and development methods.

Pechelbronn. Mining and Refining At Pechelbronn, E. C. Isom. Oil & Gas Jl., vol. 23, no. 10-A, July 31, 1924, pp. 124 and 140, 2 figs. Drilling wells, sinking shafts and treating sand employed to extract oil; refinery adopting many American methods.

The Oil Mines of Pechelbronn, J. F. Carter. Petroleum Wld., vol. 21, no. 286, July 1924, pp. 268-270. Impressions of T. E. Swigart, superintendent of experimental station, Bur. Mines, received from inspection of this district where there are extensive oil mines as well as producing wells, to obtain information on properties of oil sands.

Persia. Present Progress In Persian Oil Fields, C. Greenway. Oil & Gas Jl., vol. 23, no. 30, Dec. 18, 1924, pp. 130 and 205-206, 1 fig. Geological characteristics and report of operations of Anglo-Persian Oil Co.

Property Appraisal. Appraisal of Oil and Gas Properties, R. H. Johnson and P. Ruedemann. Serial article in Nat. Petroleum News, vol. 16, beginning Aug. 6, and ending Dec. 10, 1924. Aug. 6: Kinds and purposes of appraisal. Aug. 13 and 20: Definitions of expressions used in valuation work. Aug. 27: Organization of work. Calculation of past and present yield. Sept. 3, 10, and 17: Line and underground loss and field reduction factor. Estimation of future yield of producing wells; methods and decline curves. Sept. 24: Estimation of future yield of producing wells; ultimate and total recovery. Estimation of future yield of undeveloped areas, proven and unproven. Oct. 15: Refinements in estimation of future yield. Oct. 22, 29, and Nov. 5: Prediction of future prices. Nov. 19: Future cost of development and improvements. Dec. 10: Discount factor in annual analytical appraisals.

Queensland. The Search for Oil in Queensland, H. I. Jensen. Indus. Australian & Min. Standard, vol. 72, nos. 1869, 1870, 1871, and 1872, Oct. 2, 9, 16, and 23, 1924, pp. 500, 536, 569, and 600. Oct. 2: Oil legislation; labor politics and oil. Oct. 9: Oil indications and oil drilling. Oct. 16: Western Walloons. Oct. 23: Salt gas, mound springs, and oil.

Rumania. The Rumanian Oilfields, J. H. Blakiston. Instn. Petroleum Technologists—Jl., vol. 10, no. 46, Nov. 1924, pp. 775-786, 9 figs. Description of geology. Field engineering notes on Moreni.

Russia. Baku Field Production, S. A. Hamilonoff. Nat. Petroleum News, vol. 16, no. 30, July 23, 1924, pp. 78-80. Summary of drilling and exploitation methods.

Characteristics of the Kuban Industrial Oil Regions, K. A. Prokopov. Petroleum & Oil-Shale Industry (Russian), vol. 6, nos. 4 and 5-6, 1924, pp. 590-621 and 763-787, 4 figs. on supp. plates. Describes these regions from a geological as well as from an industrial point of view. (In Russian with abstract in English.)

Development of the Kirmakin Suite on the Bibi Eibat Field (Russian), S. A. Kovalevsky. Azerbayjan Oil Industry, no. 5-6 (29-30), May-June 1924, pp. 38-40. Description and statistical data including depth of drilling, date of initial drilling, and date of reopening. Kirmaki deposit affords information as to Bibi-Eibat disjunctive fault.

Oil Deposits of the Kabristan Fields, I. M. Goubkin. Petroleum & Oil-Shale Industry, vol. 5, nos. 7-8 and 10, July-Aug. and Oct. 1923, pp. 60-67 and 403-415, 3 figs. Geological description of districts; stratigraphy. (In Russian, with brief abstract in English.)

Possible New Oil Bearing Region Near the Town of Machac-Kala (Formerly Petrovsk) of the Dagestan Republic, K. P. Kalitzki. Petroleum & Oil Shale Industry (Russia), vol. 8, no. 8, 1924, pp. 329-333. No drillings appear to have been made yet. (In Russian with abstract in English).

The Dgengui Oil-Bearing District, S. M. Apresov. Azerbeijan Oil Industry (Russian Oil Paper), no. 11, Nov. 1924, pp. 41-44, 1 fig. on supp. plate. (In Russian.)

The New Oil Field Near Mahach-Kala (Petrovsk) in Dagestan, K. Kalitsky. Azerbeijan Oil Industry (Russian Oil Paper), no. 9, Sept. 1924, pp. 33-35. (In Russian.)

Salt Domes, Origin of Cap Rock of. The Origin of the Cap Rock of Salt Domes, J. E. Hackford. Oil Eng. & Finance, vol. 5, no. 101, Sept. 1924, pp. 512 and 515-516. Existing salt dome theory and cap rock theory as commonly accepted, and new theory of formation of salt dome and its cap rock.

Texas. The Minerva Oil Field, Milam County, Texas, D. S. Hager and I. O. Brown. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 632-640, 3 figs. Topography, stratigraphy, structure, and development.

The West Texas Oil District, R. E. Allen. Min. & Oil Bul., vol. 10, no. 8, Aug. 1924, pp. 804-805 and 859, 3 figs. Deals with geology, stratigraphy, and structure; development of three new fields.

Venezuela. Oil Geology of Northern Venezuela, A. H. Garner. Am. Inst. Min. & Met. Engrs.—Trans., no. 1381-G, Oct. 1924, 11 pp., 2 figs. Oil is known to occur in many formations ranging in age from cretaceous to quaternary; most prolific source of oil is probably cretaceous shales and limestones, from which oil appears to have migrated into overlying porous beds; faulting or fracturing, folding, and porosity are governing in localization of commercial deposits.

Oil Prospecting on the North Coast of Venezuela,

M. L. Thomas. Oil Eng. & Finance, vol. 5, no. 98, June 1924, pp. 327-330, 6 figs. Gives geological structure in relation to location of wells and methods of drilling.

The Oilfields of Venezuela, M. O'Shaughnessy. Petroleum Times, vol. 12, nos. 307 and 308, Nov. 22 and 29, 1924, pp. 801-806 and 845-848, 8 figs. General survey, giving drilling statistics. Particulars of La Rosa field, about 32 km. southeast of Maracaibo City on eastern shore of lake, now a scene of great activity, of region west of lake, of Mene Grande field and the southeast, and of region from Maracaibo Straits to Atlantic coast.

Wyoming. Oil and Gas Fields of the Lost Soldier-Ferris District, Wyoming, A. E. Fath and G. F. Moulton. U. S. Geol. Survey—Bul., no. 756, 1924, 55 pp., 17 figs. partly on supp. plates. Results of geologic findings; stratigraphy; structure; oil and gas fields; petroleum analyses; determinations of porosity.

Oil Development in Southern Wyoming, J. G. Bartram. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 583-585. Developments; anticlines in Laramie Basin; Lost Soldier district.

The Teapot Dome Naval Reserve No. 3, Wyoming, F. G. Clapp. Oil Trade Jl., vol. 15, nos. 3, 4, 5, 6, 7, 8, and 9, Mar., Apr., May, June, July, Aug., and Sept. 1924, pp. 31-35; 38-39 and 92; 58, 60, 62 and 84-85; 58, 60, 62 and 90; 68 and 70; 70 and 72; and 60 and 62, 16 figs. See also Nat. Petroleum News, vol. 16, no. 13, Mar. 26, 1924, pp. 69-74, 76-81 and 83. Report made to Senate Committee on Public Lands regarding special investigations carried out.

OIL FUEL

Auto-Ignition. See LUBRICATING OILS, Auto-Ignition.

Bergius Production Process. The Bergius Process (Le procédé Bergius), P. Erculisse, F. Ranwez and P. Bruylants. Chaleur & Industrie, vol. 4, no. 44, Dec. 1923, pp. 931-943, 13 figs. Study of process which consists essentially in effecting a cracking under high hydrogen pressure; results of tests and practical experiences.

Burners. Combustion Devices for Liquid Fuel, W. Trinks. Fuels & Furnaces, vol. 2, nos. 1, 2, 3, and 4, Jan., Feb., Mar., and Apr. 1924, pp. 21-24, 135-138, 255-258, and 349-352, 22 figs. Jan.: Burners of vaporization and atomization type or combination of both. Feb.: How atomization is accomplished. Mar.: High furnace atomization; low-pressure atomization. Apr.: Means for proper mixing of atomized liquid fuel and air.

Correct Methods of Using Fuel Oil, H. A. Anderson. Iron Age, vol. 113, no. 7, Feb. 14, 1924, pp. 518-519. Analysis of four types of oil burners, three types of furnaces and combinations of furnaces with burners.

Domestic Oil Burning, L. B. French. Sheet Metal Worker, vol. 15, no. 1; Feb. 1, 1924, pp. 10-11 and 28. Future of domestic oil burner covering oil storage facilities, automatic controls, and principles of operation.

Measuring Oil Burner Steam Consumption, F. A. Rothwell. Power Plant Eng., vol. 28, no. 3, Feb. 1, 1924, pp. 175-176, 5 figs. Points out that orifice manifold for measuring steam consumption can easily be made in plant.

Oil Firing for Steam-Boiler and Central Heating Plants (Oelfeuerung bei Dampfkesseln und Zentralheizungen), M. Hottinger. Schweizerische Bauzeitung, vol. 83, nos. 25, 26, vol. 84, nos. 4 and 5, June 21, 28, July 26 and Aug. 2, 1924, pp. 292-295, 305-307, 44-48 and 58-62, 41 figs. Describes burners of various types used in industrial plants and locomotives; steam boiler plants with oil firing; oil firing for central heating boilers; kinds of oils and their properties, operating costs of heating by means of oil and of coke.

The Fuel Oil Burner from Fire Chief's Standpoint, A. J. Caulfield. Fire & Water Eng., vol. 76, no. 4, July 23, 1924, pp. 157-158 and 180. Discusses hazards of chimney defects; accepted and unaccepted types of burners; some suggestions bor better maintenance of burners. Abstract of paper read before New England Assn. Fire Chiefs.

Wallsend-Howden Oil-Burning Apparatus. Engineering, vol. 138, no. 3062, Sept. 5, 1924, pp. 345-347, 14 figs. Describes some oil-fuel burning apparatus, for marine and land purposes, exhibited by Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne, Eng., at British Empire Exhibition, viz.: steam raising apparatus, combined pumping and heating unit, furnace front for use with natural draft, furnace front for use with Howden forced draft, furnace arrangements for burning oil or coal alternately or together, and low air-pressure burner for metallurgical furnaces.

See also FUELS, Liquid and Gaseous; HEATING, Oil Burners, Use in; HEATING, HOUSE, Oil Burners; HEATING, STEAM, Central; Oil-Burning System.

Burning. Air as a Factor in Industrial Oil Burning, W. G. Barstow. Forging—Stamping—Heat Treating, vol. 10, no. 5, May 1924, pp. 203-205. Experience proves low-pressure air to be more efficient and economical than high-pressure.

Fuel-Oil Burning in the United States Navy, H. G. Donald. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 769-770. Particulars regarding type of atomizer, combustion data, draft, boilers, furnaces and refractories, characteristics of oil, atomization, pumping and heating the oil.

Hazards of Industrial Oil Burning, H. E. Newell. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 765-768. Discussion of flash point; heating of oil in storage tanks; storage methods; fire hazard; features of design; installation and operation; cause of oil fires.

How They Heat with Fuel Oil on the Pacific Coast, C. W. Wright. Heat. & Vent. Mag., vol. 21, no. 8, Aug. 1924, pp. 41-43 and 45, 4 figs. Notes on present practice in section of country where oil burning has long been successfully applied.

Oil Burning in Industrial-Plant and Central-Station Service, N. E. Lewis. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 849-851, 1 fig. Steam atomizing vs. mechanical atomizing oil burners; oil heaters; furnace volume; introducing air for combustion; firebrick problems due to high furnace temperatures.

Preparing Boiler for Oil Burning, G. Spencer. Plumbers Trade Jl., vol. 77, no. 6, Sept. 15, 1924, pp. 492-493, 4 figs. Discusses arranging and setting refractory linings and baffles, etc.

See also AUTOMOBILE MANUFACTURING PLANTS, Oil-Fuel-Burning.

Burning Equipment. Auxiliary Equipment for Oil Burning, K. Miller. Fuels & Furnaces, vol. 2, nos. 10, 11, and 12, Oct., Nov., and Dec., 1924, pp. 1047-1054, 1149-1154, and 1261-1267, 17 figs. Describes various forms of apparatus available for supplying oil and air to oil burners and points out their characteristic properties. Oct.: Classification of blowers and compressors and discussion of fan characteristics. Nov.; Turbo-blowers. Dec.: Positive pressure blowers.

The Operation of Fuel Oil Burning Equipment, A. F. Brewer. Combustion, vol. 11, nos. 2, and 5, Aug. and Nov. 1924, pp. 131-133 and 369-371, 4 figs. Aug.: Fuel oil pumps. Nov.: Fuel oil strainers.

Central Heating with. Oil Fuel for Central Heating, A. F. Baillie. Domestic Eng. (Lond.), vol. 44, no. 8, Aug. 1924, pp. 167-171. Advantages and disadvantages of oil fuel, relative costs compared with coke, amount and different methods of storage, specific heat of oil and amount of heating

surface required, frictional loss in pumping through pipes, etc.

Coke-Oven By-Product. See COKE OVENS, Oil Fuel as By-Product.

Delivery and Storage. The Delivery and Storage of Fuel Oil, G. Porter. Gas & Oil Power, vol. 19, no. 223, Apr. 3, 1924, pp. 115-116. Advantages and disadvantages of modern methods.

Efficient Use. Efficient Use of Liquid Fuel, H. A. Anderson. Foundry, vol. 52, no. 1, Jan. 1, 1924, pp. 29-30. Type of burners and amounts of air and oil pressure influence economical application of fuel oil; use of insulating brick and grade of fuel contributing factors.

Equipment, Rules for. New Fuel-Oil Rules for New York City. Heat. & Vent. Mag., vol. 21, no. 3, Mar. 1924, pp. 67-71. Amendments adopted by Board of Standards and Appeals, dealing with construction and installations of oil-burning equipment and storage and use of fuel oil.

Firing. See HEATING, STEAM, Central.

Flash Point. The Flash Point of Fuel Oil. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 595-598. Résumé of U. S. Navy's investigations; heating and pumping tests; temperatures at which inflammable gases form; conclusions.

Heavy-Oil Engines. Standardization of Fuels for Heavy-Oil Engines. Gas & Oil Power, vol. 20, no. 231, Dec. 4, 1924, pp. 58-59, 1 fig. Findings of Petroleum Committee of the Brit. Eng. Standards Assn.

Ignition Point, Determination of. Determination of Ignition Point under Pressure (Bestimmung des Zündpunktes unter Druck), J. Tauss and F. Schutte. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 22, May 31, 1924, pp. 574-578, 11 figs. and (translation) Mar. Engr. & Motorship Bldr., vol. 47, no. 564, Sept. 1924, pp. 325-328, 10 figs. Two series of tests were carried out to determine ignition under any given pressure, first for constant and second for variable pressure; values obtained vary greatly and show that testing under pressure for investigation of motor oils and mixtures in laboratory is very useful.

Installations. Oil-Burning Installations. Steamship, vol. 36, no. 423, Sept. 1924, pp. 84-87, 4 figs. Describes Smith's oil-burning installations consisting of pressure-jet, steam-jet, and air-jet systems; pressure-jet system is most efficient and simple, consisting of pump, suction and delivery filters, liquid-fuel steam heater, pressure-jet burner and furnace front or air director; describes various parts of Smith furnace front.

Locomotive, Storage and Distribution of. Facilities for Fuel Oil for Locomotives. Ry. Rev., vol. 74, no. 13, Mar. 29, 1924, pp. 602-608, 9 figs. Report of Am. Ry. Eng. Assn.'s Committee on Shops and Locomotive Terminals.

Typical Layouts for Storage and Distribution of Fuel Oil, Including Fuel Oil Stations Between Terminals. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 260, Oct. 1923, pp. 66-95, 9 figs. Discusses unloading facilities, storage, delivery, and heating. Tabulation of replies from 14 oil-using railways to a questionnaire covering general features of design of facilities for handling, storage and delivery of fuel oil; representative layout and detail plans of such facilities.

Marine Diesel Engines. Petroleum and the Marine Engineer, M. Deloise Curwen. Mar. Engr. & Nav. Architect, vol. 47, no. 556, Jan. 1924, pp. 35-36. Petroleum for internal combustion; types of fuel; heavy oil for marine work; shale oils; tar oils; animal and vegetable oils; power alcohol.

Mazout. Investigation of the Deparaffination of Groznyi Mazut, N. D. Zelinskij, B. V. Maksorov and P. P. Borisov. Petroleum & Oil-Shale Industry (Russian), vol. 6, no. 2, 1924, pp. 274-285, 20 figs. Discusses a simple method of separating out paraffin to replace usual method of refrigeration and recrystallization.

Using Mazout in Blast Furnaces (Essai sur l'emploi du mazout au haut fourneaux), D. Perietzeano. Revue de Métallurgie, vol. 21, no. 10, Oct. 1924, pp. 624-627, 2 figs. Results of experiments carried out on behalf of Roumanian government to test suitability of mazout for blast furances.

Municipal Undertakings. Fuel Oil and its Possibilities for Municipal Undertakings, Robt. H. Bicknell. Domestic Eng. (Lond.), vol. 44, no. 9, Sept. 1924, pp. 191-199, 9 figs. Advantages of fuel oil over coal; discusses air-jet, steam-jet, and pressure-jet systems of atomization.

Properties. Heating and Motor Oils (Zur Kenntnis der Heiz- und Treiböle), A. Aufhäuser. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 17, Apr. 26, 1924, pp. 419-422, 1 fig. Points out that properties of oils are functions of degree of distillation, and combustion itself is also a fractionated process; method in use for determination of flash point is of no value for Diesel-engine practice.

Specifications. See LUBRICANTS, Specifications.

Storage and Handling. The Storage and Handling of Fuel Oil in Industrial Plants, C. G. Sheffield and H. H. Fleming. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 771-773, 1 table. Storing and handling of fuel oil for land oil-burning installations; deals with location, foundations, construction of steel tanks themselves, handling and heating.

See also Locomotive.

Synthetic. Synthetic Liquid Combustibles in France. Petroleum Times, vol. 12, no. 312, Dec. 27, 1924, p. 1024. Review of Bergius process of liquefying coal and other highly carbonaceous substances; method developed by Mailhe of transforming vegetable and animal oils, that is to say, fatty acids; and method suggested by Goutal, making use of water gas from lignite coke.

Vegetable Oils. See FUELS, French Colonies.

OIL INDUSTRY

California. Problems Confronting the California Oil Industry, R. D. Bush. Min. & Oil Bul., vol. 10, no. 1, Jan. 1924, pp. 23, 25, 27, and 83, 1 fig. Biggest problem is enforced close spacing of wells or "townlot" drilling; some of the evils resulting from this practice, which would be automatically eliminated in solution of main problem. Second most important problem is storage of oil, especially of high gravity, with least cost and evaporation loss.

Corrosion Problems. How the Petroleum Industry is Solving Its Corrosion Problems. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 42-46, 7 figs. Editorial summary, based on opinions of representatives technologists in oil production, transportation, and refining.

Development Since 1911. The Development of the Petroleum Problem Since 1911 (Die Entwicklung der Erdölfrage seit dem Jahre 1911), H. O. Schlawe. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 18 and 19, May 3 and 10, 1924, pp. 429-434 and 463-467. Present importance of petroleum for world industry; present production of crude oil, and possibility of substituting other products for certain petroleum products.

Economics of. The Economics of the Oil Industry, Rob. Waley-Cohen. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 371-390 and (discussion) 391-394, 1 map on supp. plate. Gives statistics of oil price cycles; reasons why equilibrium between supply and demand in oil industry is impossible to maintain, and why

oscillations in prices of crude oil are more violent than those of other raw materials.

Fullers' Earth in. Fullers' Earth and its Application to the Petroleum Industry, A. Rauch and G. E. Pain. Instn. Petroleum Technologists —Jl., vol. 10, no. 45, Sept. 1924, pp. 687-693 and (discussion) 693-694. Extensively used as a decolorizing medium. Properties, characteristics, analyses, preparation, method of recovering Fullers' earth, etc. Bibliography.

Indiana. Petroleum Industry in Indiana in 1923, W. N. Logan. Am. Inst. Min. & Met. Engrs. —Trans., no. 1315-P, Mar. 1924, 6 pp. Survey of geological conditions, production and prices in Indiana oil fields.

Kentucky and Tennessee. Oil and Gas Conditions in Kentucky and Tennessee during 1923, W. A. Nelson. Am. Inst. Min. & Met. Engrs.—Trans., no. 1320-P, Mar. 1924, 6 pp., 1 fig. Survey of prices, production, and developments.

Pacific Cost. The Petroleum Situation as Viewed from the Pacific Coast, J. Volney Lewis. Eng. & Min. Jl.—Press, vol. 118, no. 15, Oct. 11, 1924, pp. 574-577, 5 figs. Points out that wasteful and excessive extraction of oil is malady from which petroleum industry suffers.

Persia. What American Oil Men Face in Persia, A. Heinicke. Oil & Gas Jl., vol. 23, no. 20-A, Oct. 9, 1924, pp. 182 and 186, 5 figs. Persia's mineral wealth; first Persian drilling; equipment sold; oil politics in Persia; American concession. International rivalries dominant.

Poland. Polish Petroleum Industry in 1923. Commerce Reports, no. 19, May 12, 1924, 374-375. Data on production, refining, exports, and consumption.

Price Cycles. The Economics of the Oil Industry, R. W. Cohen. Petroleum Times, vol. 11, nos. 283, 284, and 285, June 7, 14, and 21, 1924, pp. 793-796, 861-862, and 901-903, 1 fig. Discussion of oil price cycles.

Progress. Survey of Petroleum Progress. Min. & Metallurgy, vol. 5, no. 209, May 1924, pp. 232-235, 6 figs. Contains following contributions: Sampling Device, A. Knapp, p. 232, 3 figs.; Curves of Daily Performance of Producing Properties, A. Knapp, p. 233, 2 figs.; The Burbank Field (Okla.), C. V. Millikan, pp. 234-235, 1 fig.

Rumania. The Rumanian Petroleum Industry in 1923, C. Leu. Instn. Petroleum Technologists —Jl., vol. 10, no. 45, Sept. 1924, pp. 661-670. General outlook, capital, companies, activity in fields, production of crude petroleum, activities of refineries, internal consumption and exports.

Russia. Condition of Russian Oil Industry, A. Serebrowsky. Petroleum Wld., vol. 21, no. 290, Nov. 1924, pp. 447-448. Peculiarity of Russian trade; historical review, 1914-20; task of reconstruction; trade of oil products; perspective of near future; Russian and American oil industry.

Petroleum Industry in Soviet Russia During 1923, L. J. Lewery. Commerce Reports, no. 9, Mar. 3, 1924, pp. 557-559. Gross production represented increase of 11 per cent over 1922, but was only slightly more than half pre-war output. Information based on reports in official Soviet publications.

Russian Oil Industry Under Soviet Management, T. Olferieff. Min. & Oil Bul., vol. 10, no. 8, Aug. 1924, pp. 813-815 and 861, 5 figs. Abstract of report on condition of oil industry in Russia at end of 1923.

The Petroleum Industry of Russia, Wm. A. Otis. Trade Information Bul. (Supp. to Commerce Repts.), no. 263, Aug. 25, 1924, 38 pp. Description of fields; production and operation of oil fields; refineries; foreign concessions in Russian oil fields since the Revolution; transportation; markets for Russian petroleum products.

Sarawak. Empire Oil: The Progress of Sarawak, T. G. Cochrane. Roy. Soc. Arts.—Jl., vol. 72, no. 3723, Mar. 28, 1924, pp. 308-315 and (discussion) 315-319. See also Oil Eng. & Finance, vol. 5, no. 96, Apr. 1924, pp. 210-216, 5 figs. Describes petroleum industry of Sarawak, East India Islands.

Shale-Oil. Status of the Shale-Oil Industry, G. W. Wallace. Eng. & Min. Jl.-Press, vol. 118, no. 8, Aug. 23, 1924, pp. 290-292, 6 figs. Summarizes general conditions, including deposits, technology, and geology.

Trinidad. Trinidad and Its Petroleum Industry, H. R. Berry. Petroleum Times, vol. 12, no. 310, Dec. 13, 1924, pp. 937-942, 6 figs. Notes regarding Trinidad Lake Petroleum Co.; producing oil fields; drilling methods; companies operating; etc.

United States. Petroleum in the United States, D. Hager. Eng. & Min. Jl.-Press, vol. 117, no. 16, Apr. 19, 1924, pp. 636-639, 1 fig. Present and future of the industry.

OIL PUMPS

Screw. The Screw Oil Pump, R. H. Pearsall. Automobile Engr., vol. 14, no. 189, May 1924, pp. 145-147, 10 figs. Principle and analysis of pump action; experiments which corroborate analytical results.

OIL REFINERY

Power Plant for. See STEAM POWER PLANTS, Oil Refinery.

OIL SHALES

Assay Retort Studies. Assay Retort Studies of Ten Typical Oil Shales, W. L. Finley, J. W. Horne, D. W. Gould and A. D. Bauer. U. S. Bur. Mines —Reports of Investigations, no 2603, May 1924, 9 pp., 6 figs. on supp. plates. Yields and results of analyses of oil and gas produced from a number of oil-shale samples from principal deposits of Colorado and other oil shale states, compared with samples from Scotland, Australia, and Brazil.

Bibliography. Oil Shale Bibliography, 1923. Railroad Red Book, vol. 41, no. 1, Jan. 1924, pp. 11-16. Compilation, by Editorial Dept. of Railroad Red Book, of important articles on subject printed during 1923.

California. A Section of the Monterey (Salinas) Shales in Pine Canyon, Monterey County, California, W. Stalder. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 1, Jan.-Feb. 1924, pp. 55-60, 1 fig. Description of bituminous shale area, and nature of beds, particularly with relation to oil indications.

Oil Shale in Santa Barbara County, California, F. D. Gore. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 4, July-Aug. 1924, pp. 459-472, 5 figs. Comparison of California shale with other shales; location of deposits; geology; activities of operating companies.

Distillation. Investigation of Oil Shale Kerogen by the Fractionation of the Primary Bitumen in High Vacuum and by Organic Extraction, C. O. Blackburn. Colo. School Mines—Quarterly, vol. 19, no. 2, Apr. 1924, pp. 9-46, 14 figs. Investigation undertaken for purpose of securing additional information on nature of oil shale from Elko, Nev. Deals with retorting shale kerogen under diminished pressure, high vacuum fractionations of primary shale bitumen, analysis of high vacuum fractions, and methods of extractions.

Fractional "Education" of Oil From Oil Shale, M. J. Gavin and L. C. Karrick. U. S. Bur. Mines

—Reports of Investigations, no. 2588, Mar. 1924, 10 pp., 3 figs. on supp. plates. Term fractional "education" gives expression to belief that when an oil shale is heated it produces light, low-boiling oils at low temperatures, and increasingly heavier, higher boiling oils as temperature of retorting rises. Details of experiments.

The Fractional Distillation of Oils from Oil Shale. Petroleum Times, vol. 11, no. 278, May 3, 1924, p. 619, 1 fig. Describes apparatus, patented in England by R. H. Crozier, for treatment of oil shale and similar oil-yielding materials which do not become soft or plastic but retain their capacity of moving freely by gravitation when heated in a confined space; also applicable to treatment of oil-yielding materials which may be kept in continuous motion by mechanical means.

The Trumble Oil Shale Cycle Distillation Plant, V. C. Alderson. Railroad Red Book, vol. 41, no. 9, Sept. 1924, pp. 789-793, 2 figs. See also Chem. Age (N. Y.), vol. 32, no. 9, Sept. 1924, pp. 364-365, 3 figs. Discusses preheater, retort, dephlegmator, cracking stills, sulphate of ammonia, producer-gas plant, superheater, turbine, starting plant, and steam cycle.

Trumble Oil-Shale Process. Min. & Oil Bul., vol. 10, no. 9, Sept. 1924, pp. 918-919 and 983, 2 figs. Describes process which employs superheated steam throughout, under high pressure, and experimental plant at Alhambra, Cal. See also article by C. O. Sprenger in Oil Trade, vol. 15, no. 10, Oct. 1924, pp. 44 and 49.

Economics and Technology. Economics and Technology of Oil Shale, S. D. Kirkpatrick. Chem. & Met. Eng., vol. 31, nos. 16, 17, 18, and 20, Oct. 20, 27, Nov. 3, and 17, 1924, pp. 611-615, 651-655, 688-692, and 770-775, 16 figs. Oct. 20: Survey of resources and history of their development. Oct. 27: Economic problems in development. Nov. 3: Problems of mining, crushing, and retorting shale and refining its products. Nov. 17: Status of principal processes proposed for distillation; operations of Catlin and Brown retorts.

Esthonia. The Oil-Shale and Oil-Shale Industry in Esthonia, L. S. Polak. Oil Eng. & Finance, vol. 5, nos. 102 and 103, Oct. and Nov. 1924, pp. 561-565, and 618-620 and 623, 7 figs. Geographical and hydrographical; geological; Kukkersite seams; distillation of Esthonian oil shale; production and consumption of oil shale in Esthonia; oil-shale reserves, 5,000,000,000 tons.

French Industry. Bituminous Oil Shale Industry in France (Note sur la situation de l'industrie des schistes bitumineux en France), M. R. Brunschweig. Annales des Mines, vol. 6, no. 7, July 1924, pp. 5-30, 3 figs. Discusses shale industry in France and Scotland; distilling apparatus used, and measures necessary to further it in France.

Great Britain. The Oil Shales of Somerset, W. Forbes-Leslie. Chem. & Industry, vol. 43, no. 21, May 23, 1924, pp. 532-539. Chemical composition of Somerset shale; origin, composition and properties of oil; properties of crude shale oil; description of fractions.

Heat Treatment. Heat Treatment of Oil Shale, V. Z. Caracristi. Combustion, vol. 10, no. 5, May 1924, pp. 336-340, 7 figs. Position of oil shale in relation to growing consumption of gasoline, and description of apparatus for treating oil shale.

Industry, 1923. The Oil Shale Industry, V. C. Alderson. Colo. School of Mines Quarterly, vol. 19, no. 1, Jan. 1924, pp. 1-19. See also Min. Jl., vol. 144, nos. 4613, 4614, and 4615, Jan. 19, 26, and Feb. 2, 1924, pp. 47-48, 74-75, and 91-92. Résumé of industry of the different countries for 1923. See also Oil Shale Bibliography compiled by V. C. Alderson on pp. 20-29.

New Brunswick, Can. Bituminous Shales of New Brunswick, M. Lodge. Can. Min. Jl., vol. 45, no. 40, Oct. 3, 1924, pp. 972-975, 4 figs. Some estimates of quantities in New Brunswick field.

New South Wales, Australia. The Shale Oil Industry of New South Wales, N. Waterhouse. Oil Eng. & Finance, vol. 5, nos. 94 and 95, Feb. 2 and Mar. 1, 1924, pp. 86-89 and 158-160, 7 figs. Occurrence of shale; Joadja Valley operations; Wolgan Valley operations; layout of works.

Oil Production on Commercial Basis. Persistent Pioneering in Shale-Oil Production, S. D. Kirkpatrick. Chem. & Met. Eng., vol. 31, no. 23, Dec. 8, 1924, pp. 884-885, 3 figs. Results shown at Ginet's plant at DeBeque, Colo., after 5 years of experiment; refining procedure.

Refining. The Refining of Oil-Shale, E. M. Bailey. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 527-553 and (discussion) 553-559, 8 figs. and Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1933, June 6, 1924, pp. 679-682. Production of crude oil and sulphate of ammonia; distillation of crude oil; treatment or washing of distillates; extraction of solid paraffin; refining of crude solid paraffin.

Retorting. Principles of Oil Shale Retorting, J. E. Meyer. Oil & Gas Jl., vol. 23, no. 21-A, Oct. 16, 1924, pp. 92 and 101, 2 figs. Report of investigation by Colorado School of Mines covering distillation of oil from Grand Valley, Colo., shale.

Trumble Process. See Distillation.

United States Industry. Papers Presented at National Oil Shale Conference, Sacramento, California. Colo. School of Mines—Quarterly, vol. 19, no. 4, Oct. 1924, pp. 49-98, 2 figs. Includes following papers: Progress on Oil Shale, L. C. Phipps; The Naval Oil Shale Reserves, H. H. Rousseau; Trumble Shale Carbonizing and Refining Process, L. R. Ball; Imminence of Shale Oil Industry in the United States; L. C. Uren; Mining Oil Shale, L. R. Ball; The Present Oil Shale Outlook, D. D. Potter; Oil for the United States Navy, E. Winchester; Plan of Oil Shale Investigation at Colorado School of Mines, R. C. Beckstrom; and brief communications. For proceedings of conference, see pp. 3-49.

The Imminence of an Oil Shale Industry in the United States, L. C. Uren. Min. Congress Jl., vol. 10, no. 12, Dec. 1924, pp. 563-567, 2 figs. An estimate of trend of petroleum industry and of its influence on commercialization of shale oil industry.

OIL TANKS

Concrete. Concrete Oil Tanks Reinforced With Outside Bands, W. Travell. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 422-424, 3 figs. Details of design and construction of 20,000-bbl.-capacity storage tanks of Cal. Portland Cement Co., at Colton, Cal. Nominal reinforcement only in body of concrete walls but reliance against bursting pressure on tightened hoops.

Concrete Tank Construction and Its Use for the Storage of Petroleum, Norman Waterhouse. Oil Eng. & Finance, vol. 5, nos. 93 and 94, Jan. 5, and Feb. 2, 1924, pp. 15-18 and 75-77, 6 figs. Effect of oils on concrete; water and oil proofing; erection considerations; design; analysis of stresses; internal pressure.

Design. Oil Tanks (Tankanlagen), Fr. Bürk. Chemiker-Zeitung, vol. 48, nos. 125 and 131, Oct. 16 and 30, 1924, pp. 757-759 and 795-796. Design of tank cars for oil and oil-products transportation; electric heating of contents; storage tanks, their construction and equipment, police regulations; Oct. 30: Foundations for oil tanks; protection devices.

Fire Hazard, Measurement of. System for

Measuring Fire Hazard of Tanks, Stills and Contents. Nat. Petroleum News, vol. 16, no. 30, July 23, 1924, pp. 83-86. Gives code which is new analytic system prepared by West. Actuarial Bur. for measurement of relative fire hazard oil tanks and stills, and contents; system is applicable to all mineral oils, benzol and similar volatile and flammable products of coal tar, and alcohol and turpentine.

Fire Prevention. Vapor Tight Tanks, Well Vented, Will Reduce Fire Hazard, W. C. Platt. Nat. Petroleum News. vol. 16, no. 22, May 28, 1924, pp. 111-119. Proposed revision of regulations for construction and installation of oil-burning equipments where competent attendant is constantly on premises, and for storage and use of oil fuels used therewith; general requirements of piping.

Insulation Against Evaporation Losses. Insulation Against Evaporation Losses, E. H. Clausen. Min. & Oil Bul., vol. 10, no. 2, Feb. 1924, pp. 175, 177, and 179, 4 figs. Methods of preventing losses; insulating with hairinsul; advantages of Johns-Manville insulated tank top which can be applied to either wooden or steel decks.

Protection from Lightning. Investigations into the Protection of Oil Storage-Tanks from Lightning, W. R. Macdonald. Instn. Petroleum Technologists—Jl., vol. 10, no. 41, Feb. 1924, pp. 92-97 and (discussion) 97-99. Details of apparatus used in investigations, and conclusions drawn.

Welding. See ELECTRIC WELDING, Oil Tanks.

OIL TURBINES. See GAS TURBINES, Development.

OIL WELLS

Back Pressure, Effect of. Effect of Back Pressure on Wells in Brock Field, J. M. Lovejoy. Am. Inst. Min. & Met. Engrs.—Trans., no. 1292-P, Jan. 1924, 5 pp., 1 fig. Describes tests carried out in Brock Field, Carter County, Okla., showing that back pressure on flowing wells is a waste rather than a conservation of natural forces; stopcocking, however, gives encouraging results.

Boreholes. See BOREHOLES.

Casings, Welding. Arc Welded Well Casings. Welding Engr., vol. 9, no. 4, Apr. 1924, pp. 19 and 28, 4 figs. Discusses casing 13 in. in diameter, made of No. 10 gage iron, two ply and built in 30-ft. sections, each section consisting of 10 3-ft. joints. How work is routed through shop; efficiency of welded casings.

Cementing. Cementing Wells for Shutting Off Water, H. R. Berry. Petroleum Times, vol. 12, no. 307, Nov. 22, 1924, pp. 809-810, 1 fig. Notes on mechanical appliances and methods for cementing necessary for excluding from oil sands any water which may be encountered during drilling of an oil well.

Cleaning. Use of Liquids in Cleaning Oil Wells, L. Suverkrop. Petroleum Wld., vol. 21, no. 285, June 1924, pp. 221-226, 3 figs. Importance of careful choice of methods, and discussion of methods as practiced in oil fields of California.

Control. Mechanical Control of High-Pressure Oil Wells, A. J. Mason. Petroleum Times, vol. 12, no. 299, Sept. 27, 1924, pp. 481-484, 4 figs. Discusses some of the more important features of oil-well control and presents sketches showing the different methods of arranging connections at surface.

Drilling. An Improved Electric Rotary Oil Well Drilling Device, L. H. Keim. Jl. Electricity, vol. 53, no. 10, Nov. 15, 1924, pp. 364-365, 3 figs. Describes Hild differential drive which has been tested and proved in the fields during past two years.

Computation of the Breaking Stress of Long Rods and Ropes Used in Cable-Tool Drilling, L. S. Leibenzon. Petroleum & Oil-Shale Industry (Russian), vol. 6, no. 4, 1924, pp. 645-656, 8 figs. Neglecting stresses caused by weight of rod transmitting motion to drilling tools and by weight of auger stem with bit attached, determines breaking stress produced by momentum alternating in whole length of rod during its reciprocating motion. Points out some peculiarities connected with work of a high velocity percussion outfit. (In Russian).

Cost of Drilling in American Fields. Oil & Gas Jl., vol. 23, no. 10, Feb. 7, 1924, pp. 34 and 131-135. Drilling costs of different fields; wide variance in necessary expenditures.

Hazards of Drilling for Crude Petroleum, J. McIntyre. Oil & Gas Jl., vol. 23, no. 16, Mar. 20, 1924, pp. 68-70. Result of drilling test wells in 140 counties in Kansas, Oklahoma, Texas, Arkansas and Louisiana in 1923; percentage was 81.3.

Logging Wells Drilled by the Rotary Method, E. Kraus. Am. Assn. Petroleum Geologists—Bul., vol. 8, no. 5, Sept.-Oct. 1924, pp. 641-650. Measurements, method of determining formations, and details in recognition of formations.

Modern Diamond-Drill Practice, J. A. MacVicar. Min. Mag., vol. 30, nos. 3 and 4, Mar. and Apr. 1924, pp. 147-154 and 201-208, 8 figs. Describes advances in development of applications of diamond-drill, particularly in connection with oil exploration and oil-well sinking.

Percussion Systems of Drilling, H. G. Austin. Instn. Petroleum Technologists—Jl., vol. 10, no. 45, Sept. 1924, pp. 695-704 and (discussion) 704-706. Describes evolution of percussion system.

The Characteristics of the Rotary Drilling in Surakhany, A. Semenov. Azerbeijan Oil Industry (Russian Oil Paper), no. 11, Nov. 1924, pp. 50-54. (In Russian).

The Critical Line of Drilling in Oil-field Development, S. H. Brockunier. Eng. & Min. Jl.-Press, vol. 117, no. 21, May 24, 1924, pp. 850-851, 2 figs. Discussion of evil of overdrilling, with reference to Petrolia-Oil Springs district in Ontario.

The Evolution of Oil-Well Drilling Methods, A. B. Thompson. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 432-451 and (discussion) 451-458, 8 figs. See also Can. Min. Jl., vol. 45, no. 47, Nov. 21, 1924, pp. 1147-1150. General classification of systems in use; process of evolution.

The Modern Rotary Drilling System, L. R. McCollum. Instn. Petroleum Technologists—Jl., vol. 10, no. 41, Feb. 1924, pp. 1-26 and (discussion) 26-41, 9 figs. partly on supp. plates. Adaptability of the system; principle of operation; description of the different parts, including draw works, rotary machine, shaft drive, pumps, hoisting tackle, drill pipe, drilling bits, etc.; use and action of mud fluid; use of core barrels; speed; etc.

World's Rotary Drilling Record Broken, 7226 feet. Petroleum Times, vol. 12, no. 292, Aug. 9, 1924, p. 213, 1 fig. Union Oil Co. of Cal. established world's deepest rotary record with depth of 7226 ft., taking 351 days.

Extraneous Gas, Effect on. Effects of Extraneous Gas on Oil Wells, M. J. Kirwan. Oil & Gas Jl., vol. 23, no. 8-A, July 17, 1924, pp. 32, 96-100, 138-139 and 142-143, 1 fig. Exhaustive study of migrating gas on oil production from Lyons sand shows output was greatly increased.

Fire Protection. See FIRE EXTINGUISHERS, Foam.

Flooding. New Method of Flooding Bradford Sand Is Now Successfully Used, L. E. Smith. Nat. Petroleum News, vol. 16, no. 6, Feb. 6, 1924, pp. 37-38 and 41-45, 2 figs. Description of triangular method, evolved by Forest Oil Co., of Bradford, Pa.

Flowing. Some Methods Of Prolonging Natural Flow Of Oil Wells, J. M. Lovejoy. Nat. Petroleum News, vol. 16, no. 21, May 21, 1924, pp. 71, 73 and 74-75. Compilation of notes and letters on subject of flowing wells, dealing chiefly with methods of flowing.

Fluid Recovery from. Fluid Recovery from Oil and Gas Wells, S. C. Herold. Oil & Gas Jl., vol. 23, nos. 23-A, 25-A, 27, and 28, Oct. 30, Nov. 13, 27, and Dec. 4, 1924, pp. 21 and 125; 32, 76 and 78; 32, 126-127 and 132-135; and 32, 124, 126 and 128-132. Oct. 30: Data procured as result of intensive study of conditions in various fields prepared on scientific lines. Nov. 13: Functions pertaining to fluid delivery; proper terminology explained. Nov. 27: Explains fundamental conceptions.

Mud Fluid, Use of. Use of Mud Fluid in Rotary-Drilled Wells, W. J. Kirwan. Oil & Gas Jl., vol. 23, no. 26, May 29, 1924, p. 59, 2 figs. See also Petroleum Wld., vol. 21, no. 286, July 1924, pp. 265-267, 2 figs. Results of study and experiments by government engineers in Tonkawa and other fields on use of mud fluid for protecting upper oil and gas deposits cased off in wells drilled by rotary method; preparation of fluid important.

Oil-Exploitation Curves. Oil-Exploitation Curves of Oil Wells in Connection with the Subterranean Conditions of Oil Deposits, L. S. Leibenzon. Petroleum & Oil-Shale Industry, vol. 6, no. 1, Jan. 1924, pp. 40-65, 21 figs. Detailed investigation of exploitation curve of single bore hole and of whole oil deposits as function of subterranean conditions of oil deposit; author compares his equations of decline curve with same equations deduced by Ch. S. Larkey for exploitation of oil plots in Oklahoma, and finds them absolutely identical as to form; deduces formula of mass expenditure of gas flowing out of porous medium analogous to formula of O. Meyer; theoretical investigation of influence of thickness of oil-bearing bed on appraisal curves. (In Russian.) English abstract, pp. 64-65.

Oil Quantity Estimation. Estimating Future Oil Reserves with Particular Reference to Deep Pools in Los Angeles Basin, R. F. White. Min. & Oil Bul., vol. 10, no. 7, July 1924, pp. 696-697 and 775, 1 fig. Suggests method for estimating quantity of oil that may reasonably be expected after well has reached stage where mechanical methods of recovery are necessary.

Plugging. Plugging Wells With Lead Wool; Method and Material Described. Oil & Gas Jl., vol. 23, no. 8-A, July 17, 1924, pp. 72 and 80, 1 fig. Discusses "top" and "bottom" water, pumping water, lead wool, plugging methods, physical properties, etc.

Pole-Tool Fishing. Galician-Canadian Pole Tool Fishing Methods. Oil Eng. & Finance, vol. 5, nos. 94 and 95, Feb. 2 and Mar. 1, 1924, pp. 80-81 and 145-146, 4 figs. Casing accidents; complications caused by runaway tools, poles, and casing; complicated fishing with pole tools, many instances given are also applicable to other drilling systems.

Production-Decline Curves. Determining the Constants of Oil-production Decline Curves, H. M. Roeser. Am. Inst. Min. & Met. Engrs.—Trans., no. 1347-P, June 1924, 14 pp., 5 figs. Short cuts for determining constants of oil-decline curves, with method of least squares as starting point, are presented and applications made to practical examples; nature of raw data does not justify rigid adherence to orthodox theory but does lend justification to convenient methods of approximation within reasonable limits.

Production Increase. Increasing Production of Petroleum by Increasing Diameter of Wells, L. C. Uren. Am. Inst. Min. & Met. Engrs.—Trans., no. 1364-G, Oct. 1924, 21 pp., 12 figs. Demonstrates that flow of petroleum into well from stratum of oil-saturated sand of uniform texture increases with diameter of well; conclusion is supported by experimental evidence; it appears that if well may be reamed to diameter of 20 ft. within oil-sand, its production will be approximately doubled; novel method is proposed for forming and supporting cavity of such proportions within oil-producing stratum.

Pumping. A New Method of Pumping Oil Wells Now Used In Southeast Ohio, J. O. Lewis. Nat. Petroleum News, vol. 16, no. 8, Feb. 20, 1924, pp. 53-54, 2 figs. Description of method used in oil fields around Marietta, Ohio, known as Smith-Dunn Air Pump, employing air or gas to lift oil from well; has advantages of low installation and operating costs, extreme simplicity in construction and operation, and great reduction in cleaning out and pulling jobs.

Long Stroke Pumping and Meiers-Reskey Drive, R. E. D. Foster. Oil Trade Jl., vol. 15, no. 7, July 1924, pp. 33-36, 86-87, 3 figs. Present-day equipment; crank extension pumping. Describes H. M. A. (Meiers) geared long-stroke pump.

Long Stroke Pumps for Oil Wells, G. R. Taaffe. Oil Trade Jl., vol. 15, no. 6, June 1924, pp. 36, 38, and 40, 9 figs. Describes various designs.

Long Stroke, Slow Motion Pumps Used Successfully In Oklahoma, A. F. Hinton. Nat. Petroleum News, vol. 16, no. 12, Mar. 19, 1924, pp. 91-92, 4 figs. Describes appliances used in connection with long stroke pumping with slow motion.

Water in. Water Maintenance and Shutting Off in Oil Wells (Wasserhaltung und Wasserspersrung in Oelbergwerken), G. Schneiders. Montanistische Rundschau, vol. 16, no. 23, Dec. 1, 1924, pp. 663-668, 2 figs. Discusses making use of water, and shutting it off for oil production, giving examples.

OILS

Chinese Wood. American Tung-Oil Culture, H. A. Gardner. Paint Mfrs.' Assn.: of U. S., Sci. Section—Circular no. 195, Jan. 194, pp. 207-241, 11 figs. Progress made on 279 acres now being worked in Florida, followed by a reprint from China Bur. Pub. Information, Bul. No. 1, on Chinese Wood Oil, by D. Y. Lin.

Chinese Wood Oil, F. H. Rhodes and T. T. Ling. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1051-1055, 1 fig. Geographical location of Chinese wood or tung oil; uses; extraction methods; distribution; outlook for industry; physical and chemical properties.

Colloid Chemistry. Colloid Chemistry in the Technology of Oils and Fats, N. G. Chatterji. Chem. Age (Lond.), vol. 10, no. 240, Jan. 19, 1924, pp. 56-58. Discusses bearing of recent research in colloid chemistry on refining of oils and fats, on glycerides which undergo a chemical change without being saponified, and on saponification of oils and fats.

Core-Binder. See CORES, Binders.

Drying, Polymerization of. So-called Polymerization of Drying Oils (Ueber die sogenannte Polymerisation der trockenen Oele), H. Wolff. Zeit. für angewandte Chemie, vol. 37, no. 38, Sept. 18, 1924, pp. 729-732, 1 fig. It is shown that there can be not more than trace of polymerization in process of thickening, and it is concluded that phenomenon is actually a colloidal gelation in which at most only small portion of oil actually

undergoes chemical change; this view is supported by fact that large proportion of unchanged oil can be recovered from highly gelatinized tung oil. See also critical remarks on above article by R. S. Morrell, in Chem. & Industry, vol. 43, no. 51, Dec. 19, 1924, p. 362T.

Drying Process. The Drying Process of "Drying" Oils (Ueber den Trocknungsprozess der "trocknenden" Oele), H. Wolff. Chemiker-Zeitung, vol. 48, no. 146, Dec. 4, 1924, pp. 897-899. Oxidation of oils in connection with drying forms only a part of phenomena; the actual drying process must not be identified with oxidation and absorption of oxygen; drying process shows forth at least three phases: oxidation under formation of colloidal solution; formation of gel; and further oxidation of solidified film.

Extraction from Seeds and Nuts. The Extraction of Oil from Seeds, Nuts and Kernels, J. Brewis. Chem. & Industry, vol. 43, no. 5, Feb. 1, 1924, pp. 111-119, 8 figs. Describes seed and lint-cleaning plant; decorticating plant; milling, etc.; extraction by means of solvents.

Hydrogenation. Catalytic Hydrogenation of Some Unsaturated Compounds, Especially of Oils, with Nickel at the Ordinary Temperature (Die katalytische Hydrierung einiger ungesättigter Verbindungen, insbesondere von Oelen, mit Nickel bei Zimmertemperatur), M. Tanaka. Chemiker-Zeitung, vol. 48, no. 5-6, Jan. 12, 1924, pp. 25-26. Nickel prepared as described by Kelber may be employed as catalyst in hydrogenation at ordinary temperature.

On the Catalytic Hydrogenation of Certain Oils, L. Kahlenberg and Tsu Pei Pi. Jl. Physical Chem., vol. 28, no. 1, Jan. 1924, pp. 59-70, 2 figs. Continuation of research, object of which is to find other and more effective catalysts and to test these on cottonseed and other oils as well as on free fatty acids actually prepared from these oils.

The Recognition of Hydrogenated Oils, K. A. Williams and E. R. Bolton. Analyst, vol. 49, no. 583, Oct. 1924, pp. 460-465, 2 figs. Describes use of iso-oleic acid for detection of hydrogenated oils; separation of solid and liquid fatty acids; approximate estimation of hydrogenated oil.

Insulating. Insulating Oils for Oil Circuit Breakers, D. Harvey. Elec. Jl., vol. 21, no. 12, Dec. 1924, pp. 573-578, 7 figs. Manufacture of insulating oil; properties of oils; shipment and sampling; method of test for dielectric strength; storage; placing oil in service; maintenance; purification.

Lubricating. See LUBRICATING OILS.

Mineral. See MINERAL OILS.

Palm Oil. Palm-Oil Extraction Plant. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 513-514, 8 figs., partly on supp. plate. Details of palm-oil extracting and kernel-separating plant for Nigeria, shown at Brit. Empire Exhibition.

Purification. The Purification of Oils, W. W. Myddleton. Chem. Age (Lond.), vol. 10, no. 245, Feb. 23, 1924, pp. 186-187. Deals with individual purposes for which oils are used, and discusses individual properties which should be sought for in each instance and constituents which should be retained or eliminated.

Solid Impurities, Removal of. Methods of Removing Solid Impurities from Extracted Oils and Fats (Wege zur Beseitigung des Schmutzes aus extrahierten Oelen und Fetten), B. Hassel. Chemiker-Zeitung, vol. 48, no. 22, Feb. 20, 1924, p. 92. Solid impurities may be removed from extracted oils and fats by settling; oil is heated to from 60 to 80 deg. cent. in rectangular tanks provided with steam coils and steam then shut off; after standing for 8 to 12 hr. impurities are removed from bottom of tank through valve and oil is decanted off from top; use of filter press is more satisfactory, but not always practicable on account of cost; oil may also be recovered from solid residue by steaming only.

Sulphurous. The Sulphurous Oil Industry of Spain (Die Sulfuröl-Industrie Spaniens), J. Bohle. Chemiker-Zeitung, vol. 48, no. 124, Oct. 14, 1924, pp. 745-746. Production of olive oil, including refining, deodorizing, etc.; sulphurous oils produced from residue called "orujo," by extraction with bisulphide of carbon, and apparatus used.

Transformer. See TRANSFORMERS, Oils.

Tung. See Chinese Wood.

Vegetable. A Vegetable Oils Industry for South Africa, E. F. English. S. African Jl. of Industries, vol. 7, no. 3, Mar. 1924, pp. 171-176. Consideration of sources and possibilities of a number of oils, large quantities of which are at present imported.

See also Palm Oil.

OPEN-HEARTH FURNACES

Acid. Importance of Temperature in Acid Open-Hearth Practice, E. G. Smith. Foundry Trade Jl., vol. 30, no. 426, Oct. 16, 1924, p. 341. Advantages of hot working are summarized.

Charging Equipment. Charging Devices in modern Open- Hearth Plants (Beschickvorrichtungen in neuzeitlichen Martinwerken), E. Blau. Chemiker-Zeitung, vol. 46, no. 44, Apr. 10, 1924, pp. 222-225, 6 figs. Deals with trough charging machines and cranes and ingot charging and withdrawing cranes.

Construction. Modern Open-Hearth Furnaces (Les fours martin modernes), J. A. de Grey. Génie Civil, vol. 85, no. 19, Nov. 8, 1924, pp. 426-430. Details of a modern installation of open-hearth furnaces in northeastern France, and comparison of American and European furnaces as to construction and dimensions.

Design. General Aspects in the Construction of Open-Hearth Furnaces (Allgemeine Gesichtspunkte für den Bau von Martinöfen), E. Diepschlag. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 48, Nov. 29, 1924, pp. 1233-1236, 20 figs. Discusses different forms of heat transmission; application of theory of heat transmission to design and operation of open-hearth furnaces; recent developments of open-hearth-furnace ends and heat accumulators.

Performance and Efficiency as Fundamentals for the Design and Calculation of Open-Hearth Furnaces (Leistung und Wirkungsgrad als Unterlagen für Bau und Berechnung der Siemens-Martin-Oefen), H. Bansen. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Stahlwerksausschuss, report no. 82, May 10, 1924, 23 pp., 19 figs. Functions of furnace; working conditions for temperature drop; heat circulation; relations of fuel supply and preheating to furnace efficiency and fuel consumption; calculation of heat required and efficiency; special means of influencing temperature drop; combustion, temperature conditions and heat transmission; heat accumulators; waste-heat utilization.

Some Recent Developments in Open-Hearth Steel Practice, G. A. V. Russell. Iron & Coal Trades Rev., vol. 109, no. 2944, Aug. 1, 1924, pp. 197-198. Discusses limitations of furnace charges; furnace hearths, coke-oven gas; mixed gases, thermal efficiency, furnace regenerators, furnace construction, etc. Abstract of paper read before Yorkshire Assn. of Instn. Civil Engrs.

Dimensions and Performances. Dimensions and Performances of Open-Hearth Furnaces (Ueber Abmessungen und Leistungen von Siemens-Martin-Oefen), H. Bansen. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Stahl-

werksausschuss, report no. 81, May 10, 1924, 7 figs. and supp. table, 8 figs. Report on result of questionnaire; includes table showing comparative performance and dimensions of German open-hearth furnaces.

Efficiency. The Efficiency of Open-Hearth Furnaces (Wirkungsgrade im Betriebe des Siemens-Martin-Ofens), G. Bulle. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Stahlwerksausschuss, report no. 80, May 10, 1924, 3 pp. Committee report on metallurgical, furnace, and producer performance.

End Design, Moll Method. The Moll End for Open-Hearth Furnaces (Der Moll-Kopf für Siemens-Martin-Oefen), H. Moll. Stahl u. Eisen, vol. 44, no. 8, Feb. 21, 1924, pp. 193-196 and (discussion) 197-202, 2 figs. See also (translations) Iron & Coal Trades Rev., vol. 108, no. 2925, Mar. 21, 1924, p. 478, 2 figs.; Foundry Trade Jl., vol. 29, no. 398, Apr. 3, 1924, pp. 275-276, 2 figs.; and Iron Age, vol. 113, no. 19, May, 1924, pp. 1277-1278, 1 fig. Describes new design of furnace end in which to secure a perfect mixture of gas and air before its admission to hearth, gas and air is led into a common flue and thence into hearth; end of furnace is so designed that gas flows without change of direction, and impinges at right-angles on air current flowing upward.

Extensions, Inland Steel Co. Increases Steelmaking Capacity, E. C. Boehringer. Iron Trade Rev., vol. 74, no. 24, June 12, 1924, pp. 1566-1567, 3 figs. Extension at open-hearth department of Inland Steel Co. plant at Indiana Harbor, Ind.; augments output 18 per cent; charging doors and reversing valves electrically operated; describes new units.

Gases in, Sulphur Absorption from. Absorption of Sulphur from Gas in Siemens-Martin Furnaces (Die Aufnahme des Schwefels aus dem Heizgas, im Siemens-Martin-Ofen), A. Jung. Stahl u. Eisen, vol. 44, no. 31, July 31, 1924, pp. 911-914. Discusses sulphur content in briquets, coal, generator gas and gas producer clinker, effect of addition of steam in gas producer, relations between sulphur content in gas and block on basis of melting results.

Heat Losses in. Heat Losses in Open Hearth Furnaces, W. Dyrssen. Fuels & Furnaces, vol. 2, no. 6, June 1924, pp. 565-569, 3 figs. Heat balance showing how 40 per cent of heat in fuel may be obtained in total steam in a furnace without gas checkers by passing part of waste gases from melting chamber direct to boiler.

Multiple-Flame Continuous. Multiple-Flame Continuous Melting Furnace Recovering Total Heat of Open-Hearth Process (Forno di fusione a fiamma multipla continua e a totale ricupero di calore per processo Martin), F. Fiorelli. Metallurgia Italiana, vol. 16, no. 10, Oct. 1924, pp. 446-451 and (discussion) 452-457, 5 figs. partly on supp. plates. Notes on operation of Siemens open-hearth furnace. Description of continuous multiple-flame furnace, including calculations, operation, and comparative cost data.

Operation. Efficiency in Open Hearth Furnace Operations (Wirkungsgrade im Betriebe des Siemens-Martin-Ofens), G. Bulle. Stahl u. Eisen, vol. 44, no. 43, Oct. 23, 1924, pp. 1324-1330, 1 fig. Report of subcommittee discussiong division of efficiency into (1) metallurgical (2) furnace, and (3) gas-producer efficiency, giving corresponding calculations.

Practice. Open Hearth Practice, A. W. Smith. Colo. School of Mines Mag., vol. 14, nos. 7 and 8, Nov. and Dec. 1924, pp. 8-9 and 10-16. Recommendations for design and operation.

The Flame in Open-Hearth Furnaces (La fiamma nei forni Martin), E. de Castro. Metallurgia Italiana, vol. 16, no. 10, Oct. 1924, pp. 458-488, 15 figs. Discusses application of oil fuel, furnace readjustment, and tests carried out with fuel oil operation. Cost data.

Producer-Gas-Fired. Recent Developments in Open-Hearth Furnace Practice. Fuels & Furnaces, vol. 2, no. 10, Oct. 1924, pp. 1057-1058, 2 figs. Use of jets of compressed air or steam to increase rate of combustion in producer-gas-fired furnaces.

Pulverized Coal for. See PULVERIZED COAL, Open-Hearth Furnaces.

Refractories for. See REFRACTORIES, Open-Hearth Furnaces.

Regulation. See GAS PRODUCERS, Regulation.

Waste-Heat Boilers. See BOILERS, Waste-Heat.

Waste-Heat Recovery. Recovery of Waste Heat in Open-Hearth Practice, W. Dyrssen. Iron & Steel Inst.—Advance Paper no. 6, for meeting May 1924, 48 pp., 16 figs. Complete detailed heat balance of fuel for modern American 80-ton producer-gas open-hearth furnace; results of study of heat balance; heat balance for coke-oven gas-fired open-hearth furnace is given for comparison with producer gas as fuel; steam output for various charges; comparison between blast-furnace and open-hearth practice; economic value of recovery of waste heat in steam in open-hearth practice.

See also WASTE HEAT, Recovery.

Wis. Steel Works, South Bend, Ind. Wisconsin Steel Works Adds Open-Hearth, G. L. Lacher. Iron Age, vol. 113, no. 20, May 15, 1924, pp. 1421-1425, 7 figs. Separate oil and tar systems, laminated buckstays, motor-operated doors, valves and stack dampers, and minimum of water cooling are features of new plant at South Chicago, Ill., comprising five 100-ton furnaces.

Wood Producer Gas as Fuel. The Use of Wood for the Generation of Open-Hearth Fuel Gases (Ved som martinugnsbränsle), A. Johansson. Jernkontorets Annaler, vol. 108, Tekniska Diskussionsmötet May 31, 1924, pp. 192-263, 21 figs. Extensive reports on economy obtained by use of generator gas produced from wood for open-hearth furnaces. Methods used by principal Swedish steel works. Description of machinery. Use of ashes as fertilizer.

OPHTHALMOSCOPES. See OPTICAL INSTRUMENTS, Ophthalmoscope.

OPTICAL INSTRUMENTS

Ophthalmoscope. Development of the Ophthalmoscope (Ueber die Entwicklung des Augenspiegels), A. Kühl. Deutsche Optische Wochenschrift, vol. 10, no. 27, July 6, 1924, pp. 343-348, 16 figs. Developments since Helmholtz; various types of eye-mirrors, micro-ophthalmoscopic instruments, photography, etc.

Thermal Expansion, Measurement of. A Sensitive Optical Lever Method for Measuring the Thermal Expansion of Small Specimens, J. Guild. Jl. Sci. Instruments, vol. 1, no. 7, Apr. 1924, pp. 198-204, 3 figs. Method employed is comparative one in which two specimens of suitable form stand close together on flat reflecting surface and support second reflecting surface approximately parallel to first; inclination between two surfaces is measured by auto-collimating telescope system.

OPTICAL MEASUREMENTS. See MEASURING INSTRUMENTS, Optical.

ORDNANCE

[See also GUNS.]

Design. Some Problems in the Design of Ordnance, J. B. Rose. Mech. Eng., vol. 46, no. 11a, Mid-Nov. issue, 1924, pp. 774-782, 9 figs. Out-

lines mechanical and engineering features involved in design, illustrating problems arising by reference to 75-mm. field gun.

Developments, United States. Modern Ordnance, C. C. Williams. Army Ordnance, vol. 5, no. 27, Nov.-Dec. 1924, pp. 565-570, 7 figs. Latest developments of American ordnance, including small arms, tanks, tractors, ammunition, superguns, and bombing.

Matériel, Design of. The Design of Ordnance Matériel, J. D. Pedersen. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 887-890. Procedure to be followed in designing ordnance matériel for economical, interchangeable mass production.

Production Problems, U. S. War Dept. Some Production Problems in the War Department's Preparedness Program, H. W. Churchill. Mech. Eng., vol. 46, no. 5, May 1924, pp. 268-270 and (discussion) 270-271. Coöperation of engineering, industrial, and commercial bodies with War Department; reserve officer personnel problem; problem of securing facilities for manufacturing war matériel; problems typical of those confronting plant production engineers; features of type of contract now being developed; raw materials, gases, machine tools. (Abridged.)

Steel for Manufacture of. See STEEL MANUFACTURE, Ordnance Steel.

Stores Control. Ordnance Stores Control, L. D. Booth. Army Ordnance, vol. 5, no. 25, July-Aug. 1924, pp. 431-435 and 470, 5 figs. Discusses control of supplies by commanding generals of troops; shows review sheet, consolidated review records, abstract of reviews, transfer order, and report of stores.

ORE DEPOSITS

Canada. Productiveness of the Precious-Metal Mines of Canada, W. M. Goodwin. Compressed Air Mag., vol. 29, no. 2, Feb. 1924, pp. 763-767, 13 figs. Survey of development, character, and output of deposits.

Chile. The Ore Deposits and Mines of Copiapó, Chile (Die Erzlagerstätten und der Bergbau von Copiapó, Chile), J. Kuntz. Metall u. Erz, vol. 21, no. 5, 1st Mar, no. 1924, pp. 85-99, 10 figs. Geographical and geological conditions; gold, silver, and copper deposits and production.

China. Metal Ores and Other Useful Resources of China (Die Metallerz- und andern nutzbaren Vorkommen Chinas), M. Brücher. Glückauf, vol. 60, nos. 35, 36, 37, and 38, Aug. 30, Sept. 6, 13, and 20, 1924, pp. 759-765, 789-795, 811-815, and 840-848, 10 figs. Notes on occurrence, mining and production of gold, silver, copper, lead, zinc, tin, tungsten, nickel, molybdenum, mercury, arsenic, antimony, sulphur, alum, salt and soda, petroleum, etc.

Colombia and Venezuela. Survey of Ore Deposits of Columbia and Venezuela (Ein Ueberblick ueber die Erzlagerstätten Kolumbiens und Venezuelas), O. Stutzer. Metall u. Erz, vol. 21, no. 15, Aug. 1, 1924, pp. 349-354, 1 fig. Discusses mainly gold silver and platinum in Columbia, and gold, copper, and iron in Venezuela.

Formation. Process of Formation of Stretched Out Ore Deposits (Längsträckta malmformers bildningssätt), P. J. Holmquist. Teknisk Tidskrift, vol. 54, nos. 19 and 24, May 10 and June 14, 1924, pp. 33-36 and 41-43 (bergsvetenskap), 14 figs. Compilation of various processes, whereby stretched out ore deposits, such as "chinmeys of ore," "pipes," "dragfolds," etc., are found.

Germany. Occurrence of Ore in the Mieminger Wetterstein Alps (Die Erzvorkommen in den Mieminger Wetterstein-Alpen), M. Landgraeber. Technische Blätter, vol. 14, no. 31, Aug. 2, 1924, pp. 233-235. Discusses geology and stratigraphy, tectonics, occurrence of zinc blende, lead oxide, silver, pyrites, iron, etc.

Mapping Cross-sections of. Mapping Cross-sections of Orebodies, J. E. Harding. Eng. & Min. Jl.-Press, vol. 117, no. 19, May 10, 1924, pp. 767-770, 4 figs. Describes methods. Drill-hole data and geologic deductions should be combined

New South Wales. Antimony, Arsenic, Bismuth, Molybdenum, Tungsten, E. J. Kenny. New South Wales Dept. Mines, Geol. Surv.—Bul. no. 5, 1923, 47 pp., 10 figs. partly on supp. plates. Describes ores, treatment, uses, sources of supply, and production of each.

Primary Downward Changes. Primary Downward Changes in Ore Deposits, W. H. Emmons. Am. Inst. Min. & Met. Engrs.—Trans., no. 1319-M, Mar. 1924, 29 pp., 13 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 207, Mar. 1924, pp. 140-141. Criteria for recognition of a parent igneous mass with which an ore deposit is associated; changes related to depth; rock differentiation and ore deposition; metallogenic provinces; reconstructed vein system; etc.

Sampling and Estimating. Sampling and Estimating Cordilleran Silver-Lead Limestone Replacement Deposits, B. Prescott. Am. Inst. Min. & Met. Engrs.—Trans., no. 1324-M, Mar. 1924, 11 pp. Describes various methods of sampling and cites factors that enter into estimation of these deposits.

Tasmania. See GEOLOGY, Tasmania.

Utah. Ore Deposits of the Deep Creek Range, Utah, D. O. Rohlfing. Salt Lake Min. Rev., vol. 25, no. 24, Mar. 30, 1924, pp. 11-15 and 18-19, 5 figs. Arsenic an important constituent. History, geography, and geologic and topographic features.

Venezuela. See Colombia; GEOLOGY, Venezuela.

ORE DRESSING

Ball- and Tube-Mill Liners. Ball- and Tube-mill Liners, Wm. T. W. Miller. Eng. & Min. Jl.-Press, vol. 118, no. 16, Oct. 18, 1924, pp. 613-617, 29 figs. Recent development has brought out many designs which help to increase grinding efficiency and prolong effective life of steel.

Classification. Hindered Settling Classification in Relation to Table Concentration of Idaho Lead-Zinc Ores, A. W. Fahrenwald. U. S. Bur. Mines —Reports of Investigations, serial no. 2618, June 1924, 11 pp. Results of investigating field of hindered classification in its practical and economic relation to table concentration.

Crushing. See CRUSHING, Ore-Crushing Plant.

Crushing Plants, Dust Control in. Dust Control in Crushing Plants Important, G. E. Lynch. Eng. & Min. Jl.-Press, vol. 117, no. 4, Jan. 26, 1924, pp. 165-167. How unhealthful working conditions in mills and crushing plants can be remedied.

Cylindrical Mills. Peripheral-Discharge Cylindrical Mills, A. W. Allen. Eng. & Min. Jl.-Press, vol. 117, no. 8, Feb. 23, 1924, pp. 325-328, 8 figs. Exit pulp flow through trunnion has disadvantages. Development shows progress in recent years.

Dielectric Separation. Dielectric Mineral Separation, S. J. Truscott. Nature (Lond.), vol. 114, no. 2874, Nov. 29, 1924, pp. 793-794. Discusses process brought forward by H. S. Hatfield, one based on differences in inductive capacity between minerals and one which he termed dielectric mineral separation, substances being dielectrics by virtue of their property to propagate electric forces through themselves by induction; process differs, on one hand, from ordinary electrostatic mineral separation in that it is not operative by reason of charges acquired by contact, and, on other hand, from cataphoresis.

Experimental Plant. The Experimental Ore Dressing and Metallurgical Plant of the Colorado School of Mines, S. P. Warren. Jl. Eng. Education, vol. 15, no. 4, Dec. 1924, pp. 252-258 and (discussion) 258-260. Describes test work being done at experimental plant.

Flotation. See FLOTATION.

Sintering, Fans for. Fans for Ore Sintering. Iron Age, vol. 114, no. 12, Sept. 18, 1924, p. 692, 2 figs. Severe service conditions and points of design to meet them.

Tube Mills. Recent Metallurgical Developments on the Witwatersrand, E. M. Weston. Chem. Eng. & Min. Rev., vol. 16, no. 192, Sept. 5, 1924, pp. 469-472, 3 figs. Describes new plant at West Springs in which amalgamation is entirely dispensed with.

ORE HANDLING

Bridges, Trolley Control for. Direct Current Hoist and Trolley Control for Ore Bridges, N. L. Mortensen. Iron & Steel Engr., vol. 1, no. 12, Dec. 1924, pp. 616-623 and (discussion) 623-628, 29 figs. Schemes of connections and curves are presented illustrating in general main requirements of ore bridges and what can be considered more or less average operating conditions.

Bunkers. Ore Bunkers (Erzsilo für Storch & Schöneberg A.-G., Abt. Bremerhütte in Geisweid), H. Butzer. Beton u. Eisen, vol. 23, no. 4, Feb. 20, 1924, pp. 37-38, 5 figs. Ore-bunker plant constructed for purpose of keeping blast-furnace works supplied with ore, coke and limestone; equipment for loading of bunkers.

Plants. See COAL HANDLING, Harbor Plants.

Unloaders. Mighty Machines at Conneaut Harbor. Blast Furnace & Steel Plant, vol. 12, no. 10, Oct. 1924, pp. 444-445, 1 fig. Eight modern ore unloaders discharge 70,000 tons of ore in 22 hours.

ORE SMELTING

Local. An Important Invention, J. A. Parker. Mineral Age, vol. 9, no. 2, Feb. 1924, pp. 19-20, 3 figs. To secure more favorable freight rates suggests transforming crude ore and concentrates into semi-finished furnace products and thus to reduce gross weight shipped and take advantage of favorable freight rates already established. Advantages and limitations of local smelting. Mace type open tuyere key to small unit smelting; tabulation of results in test runs on typical bodies of ore.

ORE TREATMENT

[See also metallurgy of various metals, as GOLD METALLURGY, etc.]

Complex Ores. Development of Treatment Methods for Complex Ores, R. G. Hall. Eng. & Min. Jl.-Press, vol. 117, no. 11, Mar. 15, 1924, pp. 440-445. Classifies common mineral combinations that go to make up what are known as complex ores and reviews briefly development of metallurgical methods to treat them.

Present Trend in Treatment of Complex Ores, G. L. Oldright. Am. Inst. Min. & Met. Engrs.—Trans., no. 1311-M, Mar. 1924, 15 pp. Treatment of low-grade complex ores by smelting; treatment of complex semi-oxidized ores to low-grade to be smelted; treatment of zinc concentrates and of lead-zinc middling products.

Developments. Recent Developments in the Fine Grinding and Treatment of Witwatersrand Ores, C. R. Davis, J. L. Willey and S. E. T. Ewing. Am. Inst. Min. & Met. Engrs.—Trans., no. 1386-B, Dec. 1924, 22 pp., 7 figs.

Electrolytic Refining. Improvement in Electrolytic Refining During the Last Decade, S. Skowronski. Am. Electrochem. Soc.—Paper for meeting Apr. 24-26, 1924, no. 30, pp. 391-402. Deals with refining of a crude metal anode into a refined cathode, which process is strictly "electrolytic refining," and recovery of metals from solutions obtained from ores, concentrates or metallurgical products, using various solvents.

Flotation. See FLOTATION.

Non-Ferrous Ores, Canada. Developments in the Treatment of Non-Ferrous Ores in Canada during 1923, G. J. Mackay. Can. Min. Jl., vol. 45, no. 1, Jan. 4, 1924, pp. 9-12, 4 figs. Describes developments of various companies.

Reduction Plant. Chief Consolidated Starts Novel Reduction Plant, A. B. Parsons. Eng. & Min. Jl.-Press, vol. 118, no. 15, Oct. 11, 1924, pp. 582-584, 7 figs. Flotation, tabling, and "oxide" volatilization combined; should solve long-standing treatment problem; description of plant at Eureka, Utah.

Refining, Sweden. Is It Possible to Reduce the Cost of Ore Refining in Sweden? (Kan den svenska järnmalmsanrikningen förbilligas?), H. Nathorst. Jernkontorets Annaler, vol. 108, Tekniska Diskussionsmötet May 31, 1924, pp. 36-89 and (discussion) 89-114, 11 figs. Improvements of present ore-crushing methods are described and recommended as means to reduce ore-refining costs.

Separation, Dielectric. Dielectric Separation: A new Method for the Treatment of Ores, H. S. Hatfield. Describes process depending upon action of an electrostatic field upon uncharged particles instead of charged particles. Dielectric Mineral Separation: Notes on Laboratory Work, B. W. Holman and St. J. R. C. Shepherd. The three different classes of laboratory testing that principles of dielectric separation may be applied to, and apparatus required. Instn. Min. & Metallurgy—Bul., no. 233, Feb. 1924, 15 pp., 6 figs. on supp. plates. Discussion on these two papers in no. 234, Mar. 1924, 20 pp., 9 figs.

Sintering. Ore-Sintering Processes, S. G. Smith. Iron & Coal Trades Rev., vol. 108, no. 2915, Jan. 11, 1924, p. 49. Describes Greenawalt process, including feed hoppers, sintering pan, and ignition hood; typical analyses of materials used for sintering; advantages of sintered material; other systems of sintering.

ORES

Assaying. Early Methods of Assaying, E. A. Smith, Instn. Min. & Metallurgy, no. 232, Jan. 1924, 57 pp., 7 figs. Describes history of assaying, including early furnaces and appliances, and methods used for different ores. Bibliography.

Electrometric Titration. See METALLURGY, Electrometric Titration.

Low-Grade, Microchemical Analysis of. Microchemical Analysis and Its Application in the Determination of Low-Grade Ores, E. E. Fairbanks. U. S. Bur. Mines—Reports of Investigations, serial no. 2613, June 1924, 6 pp., 3 figs. on supp. plates. Discusses microchemical analysis with aid of device for microscopic sampling.

Opaque, Determination of. The Determination of Opaque Ore-Minerals by X-Ray Diffraction Patterns, P. F. Kerr. Economic Geology, vol. 19, no. 1, Jan.-Feb. 1924, pp. 1-34, 8 figs. Shows possibilities and limits of powder method of X-ray analysis when applied to diagnosis of opaque ore minerals.

Sampling. Accuracy in Sampling Metallurgical Materials, A. C. Halferdahl. Eng. & Min. Jl.-Press, vol. 118, no. 19, Nov. 8, 1924, pp. 731-732. Faulty sampling is a frequent cause of error in metallurgical balance sheets, accuracy of sampling being often an unknown quantity. Gives a method of application of theory which

is believed to be fundamental to all sampling procedure. Basis of calculations is set forth first. Theory is due to Bowley, "Elements of Statistics," and Merriman, "Method of Least Squares."

Screening. Efficiency of Screening, R. K. Warner. Am. Inst. Min. & Met. Engrs.—Trans., no. 1293-M, Jan. 1924, 10 pp. 3 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, p. 30. Suggests method for estimating quality of work done by a screen, consisting in considering only work done on "difficult" grains, that is, those grains of which intermediate diameters closely approach screen aperture; application of this method, together with derivation of formulas and an example of their use.

Testing. Ore Testing and Its Relation to Mill Results, L. E. Booth. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 573-576. Value of microchemistry; classification and screening; amalgamation; cyanidation; jig and table concentration; flotation concentration.

Transportation by Airplane. Transporting Ore by Aeroplane. Queensland Govt. Min. Jl., vol. 25, no. 285, Feb. 15, 1924, pp. 42-45, 2 figs. Discusses factors involved. Field for investment in Queensland. Means of exploiting mineral potentialities.

ORSAT APPARATUS. See GAS ANALYSIS, Orsat Apparatus.

OSCILLATIONS

Amplitudes. The Stable Amplitudes of Incited Coupled Oscillations (Ueber die stabilen Amplituden angefachter Koppelschwingungen), W. Runge. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 34-48, 11 figs. Simple method is developed to determine, under assumption of simple nonlinear relation between current and voltage, range of stability and resistance against disturbances in incitation of amplitudes occurring in a coupled system.

High-Frequency. Experimental Study of Some Processes for Detecting High-Frequency Oscillations (Étude expérimentale de quelques procédés de détection des oscillations de haute fréquence), M. R. Dubois. Onde Electrique, vol. 3, nos. 30 and 31, June and July 1924, pp. 285-298 and 347-363, 23 figs. Discusses exact and rapid measurement of rate of modulation for sustained wave senders; results of experiments with galena and lamp detectors amplifiers, etc.

Hydrodynamic. Oscillations Produced by Aperiodic Forces in Pump Valves and Oscillatory Sirens (Entstehung von Schwingungen durch nichtperiodische Kräfte bei Pumpenventilen und Oszillatorsirenen), W. Hort. Zeit. für technische Physik, vol. 5, no. 9, 1924, pp. 384-387, 5 figs. Shows that leaf-like bodies oscillating vertically to their plane, if placed in a liquid, are made to oscillate, if liquid flows past one side.

Resonance and Damping. The Resonance Curves with Different Types of Damping (Die Resonanzkurven bei verschiedenen Dämpfungstypen), D. Roschansky. Zeit. für Hochfrequenztechnik, vol. 23, no. 2, Feb. 1924, pp. 23-31, 1 fig. Through an approximate method of calculation it is possible to determine numerically resonance effects even in case of anomalous damping; deals specifically with case of a linear damping; influence of secondary damping on anomalous resonance curves; discusses different types of damping, which can occur with spark discharge, and a new value, the mean damping factor is introduced.

Theory. Theory of Oscillation (Zur Schwingungslehre), E. Meissner. Schweizerische Bauzeitung, vol. 84, nos. 23 and 24, Dec. 6 and 13, 1924, pp. 273-276 and 283-285, 5 figs. Details of graphic theory of enforced oscillations and resonance, new graphic method of Fourier analysis of any function, graphic theory of impact in oscillating systems, and oscillating systems with pulsating elasticity.

OSCILLATORS

Vacuum-Tube. Vacuum Tube Oscillators—A Graphical Method of Analysis, J. W. Horton. Bell System Technical Jl., vol. 3, no. 3, July 1924, pp. 508-521, 11 figs. Discusses graphic methods for determining conditions of stable operation in telephone lines; coördinated testing procedure and its application on southern transcontinental line.

OSCILLOGRAPHS

Braun-Tube. On a Direct Method to Determine the Sense of Rotation of Braun Tube Diagrams, K. Seiyama. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 425, Dec. 1923, pp. 950-957, 7 figs., partly on supp. plates. Describes stroboscopic method for determining directly sense of rotation of various diagrams such as dynamic characteristics, Lissajous' figures, etc., appearing on fluorescent screen of Braun tube oscillograph. Experiments made to verify method show that it is applicable to diagram of low and moderate frequencies. (In Japanese.)

Cathode-Ray. A Practical Demonstration of Some Applications of the Cathode Ray Oscillograph, N. V. Kipping. Wireless Wld., vol. 13, no. 23, Mar. 5, 1924, pp. 705-709, 12 figs. Construction of Braun tube and of new type of oscillograph and notes on general principles of operation.

Primary Radio-Frequency Standardization by Use of the Cathode-Ray Oscillograph, G. Hazen and F. Kenyon. U. S. Bur. Standards—Sci. Paper no. 489, May 22, 1924, pp. 445-461, 11 figs. Details of use of cathode-ray oscillograph for obtaining frequency ratios for establishing values of radio frequencies in terms of audio-frequency.

The Cathode Ray Oscillograph, P. B. Findley. Tech. Eng. News, vol. 5, no. 1, Apr. 1924, pp. 14-15 and 28, 5 figs. Describes oscillograph developed by J. B. Johnson, in which disadvantages of Braun tube have been overcome.

Measurement of Torsional Moments. The Measurement of Oscillations and Torsional Moments by Means of the Oscillograph (Messen von Schwingungen und Drehmomenten mittels des Oszillographen), R. Elsässer. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 20, May 17, 1924, pp. 485-491, 20 figs. Discusses conditions for correct recording of rapidly changing processes, and points out that oscillograph is most suitable measuring instrument for this purpose; describes simple device on order of Kirchhoff-Wheatstone bridge, with which longitudinal and torsional oscillations and rapidly changing torsional moments in oscillograph can be recorded and measured; practical examples of its application.

Polar Oscillograms. Polar Oscillograms, A. G. Beliavsky. Electrician, vol. 92, no. 2382, Jan. 11, 1924, p. 38, 2 figs. Their application in electrical work; polar oscillograph.

Single-Element Portable. The Osiso, J. W. Legg. Elec. Jl., vol. 21, no. 12, Dec. 1924, pp. 564-567, 7 figs. Describes single-element oscillograph of camera size.

OSCILLOSCOPES

Elverson. The "Elverson Oscilloscope," A. J. H. Elverson. Jl. of Sci. Instruments, vol. 1, no. 4, Jan. 1924, pp. 116-119, 4 figs. Describes an opto-mechanical device designed to facilitate examination of behavior of high-speed movements under working conditions.

OTHEOGRAPH. See ELECTRIC LOCOMOTIVES, Developments; LOCOMOTIVES, Tracking Qualities, Testing; RAILS, Wheel Thrust on.

OVENS

Baking. Electric Ovens for Bakeries (Les fours électriques dans le domaine de l'alimentation). Revue Industrielle, vol. 54, no. 2178, May 1924, pp. 106-109, 3 figs. Particulars concerning electric ovens for bakers, confectioners, and pork butchers.

Coke. See COKE OVENS.

Industrial Baking. Design of an Industrial Baking Oven. Sheet Metal Worker, vol. 15, no. 19, Oct. 10, 1924, pp. 705-706, 4 figs. How designing engineer retarded heat loss by long air travel; means taken to insure even distribution of heat.

Japanning. See JAPANNING, Plant.

OVERVOLTAGES

Measurement of Decomposition Potentials and. The Measurement of Decomposition Potentials, A. L. Ferguson and G. Van Zyl. Am. Electrochem. Soc.—Advance Paper no. 26, for meeting Apr. 24-26, 1924, pp. 337-352, 2 figs. Apparatus is developed by which a direct comparison is made between all values obtained by commutator and direct methods for measuring decomposition potential and overvoltages.

Passivity and, Phenomena of. Phenomena of Passivity, and Cathodic Overvoltage (Passivitätserscheinungen und kathodische Ueberspannung), E. Liebreich and W. Wiederholt. Zeit. für Elektrochemie, vol. 30, no. 6, June 1924, pp. 263-279, 18 figs. Study of potentials assumed by electrodes of chromium, iron, and mercury in electrolyte of 0.1 per cent sulphuric acid when external negative or positive currents are passed.

Predetermination. See HARMONICS, Transformers.

Protection Against. Protection Against Excess Voltage by Voltage Drop Relays and Their Practical Application (Der Ueberstromschutz durch Spannungsabfallrelais und seine Anwendung in der Praxis), F. Alten. Elektrotechnische Zeit., vol. 45, no. 22, May 29, 1924, pp. 553-558, 12 figs. Discusses localizing of short circuits in extensive and ramified long distance lines; describes installation with protective relays in 60,000 volt system.

OXY-ACETYLENE CUTTING

Advantages and Applications. Oxy-acetylene Process of Cutting Metals. Machy. (Lond.), vol. 24, no. 604, Apr. 24, 1924, pp. 123-125, 3 figs. Advantages of method and modern applications.

Cast Iron. Cutting Cast Iron, J. Fitzgibbons. Welding Eng., vol. 9, no. 8, Aug. 1924, pp. 23-24, 2 figs. Chemical discussion of cutting cast iron by oxy-acetylene; elements found in cast iron and their affinity for oxygen.

Cutting Tips, Manufacture of. Making Oxy-acetylene Cutting Tips. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 19-21, 6 figs. See also Machy. (Lond.), vol. 24, no. 626, Sept. 25, 1924, pp. 838-840, 6 figs. Cost-reducing methods used by Harris Calorific Co., Cleveland, Ohio, in manufacturing cutting tips for oxy-acetylene outfits.

Machines. The Godfrey Oxygen Jet Cutting Machine. Engineering, vol. 118, no. 3056, July 25, 1924, pp. 124-125, 11 figs. partly on pp. 123 and 134. Describes oxygen jet cutting machine designed by Alfred Godfrey of Godfrey Eng. Wks,. London, for purpose of combining cutting with precision and working with any type of templet.

The Oxytome Metal-Cutting Machine. Engineering, vol. 117, no. 3039, Mar. 28, 1924, pp. 411-412, 6 figs. partly on p. 402. Machine for ordinary workshop purposes by use of which iron and steel plates can be cut to any regular or irregular form of profile; results of tests show that, with good cutting, effect of cut on strength of ordinary mild steel is quite negligible and cracks are not more likely to start from cut surface than from surface of ordinary sheared cut.

Steel. Eliminating the Oxygen Waste, M. Piette. Welding Engr., vol. 9, no. 12, Dec. 1924, pp. 25, 28-29 and 44, 5 figs. Abstracted translation of paper "A Contribution to the Study of the Cutting of Steel by Means of Oxy-Acetylene Flame and a Jet of Oxygen," read at 8th Int. Acetylene and Welding Congress, giving summary of principal results.

OXY-ACETYLENE WELDING

[See also AUTOGENOUS WELDING.]

Aluminum. Gas Welding Aluminum, S. W. Miller. Am. Welding Soc.—Jl., vol. 3, no. 3, Mar. 1924, pp. 44-50, 2 figs. Flux used, welding without flux, procedure in welding, character of flame, preheating, manipulation of welding rod and torch, etc.

Applications. Welding and Its Applications (La soudure et ses applications). Revue de l'Ingenieur, Feb. 1924, 128 pp., 186 figs. Series of articles by different authors dealing with production of oxygen and acetylene; apparatus used in oxy-acetylene and electric welding; micrographic study of seams; electric resistance welding; examining autogenous seams by means of X-rays; welding of aluminum; autogenous welding in naval construction, coppersmith's work, automobiles, gas holders, railroad shops, underground conduits, etc.

Automobile Bodies. All-Steel Automobile Bodies, J. W. Meadowcroft. Welding Engr., vol. 9, no. 9, Sept. 1924, p. 24. Discusses oxy-acetylene, electric, and other processes used; many advantages claimed for all-welded bodies; lightness, strength, and smooth finish.

Boilers. Rules of the French Associations of Steam Boiler Users for Repairing Boilers by Means of Autogenous and Electric Welding (Recommandations relatives aux réparations de chaudières à vapeur par soudure au chalumeau on à l'arc électrique). Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 5, no. 16, Apr. 1924, pp. 91-97. Rules covering repairs permissible, choice of material, and kind of welding, carrying out welds, tests.

See also BOILERS, Autogenous Welding.

Brass. The Oxy-Acetylene Torch on Brass Work, D. Baxter. Am. Blacksmith & Motor Shop, vol. 23, no. 2, Feb. 1924, pp. 17-18 and 25, 5 figs. Peculiarities in action of brass under heat that must be considered when applying torch flame, and just how to work brass with gas torch.

Cast-Iron Pipe, Bronze Welding of. A New Field for the Oxy-Acetylene Process. Acetylene Jl., vol. 25, no. 11, May 1924, pp. 533-536, 9 figs. Bronze welding of cast iron pipe. Bronze welding overcomes practically all of the difficulties of preheating in the field and enables construction of cast-iron lines upon an economic basis.

An Unusual Test of Bronze Welding in Cast Iron Pipe. Acetylene Jl., vol. 26, no. 4, Oct. 1924, pp. 176 and 180, 2 figs. Describes test made to determine strength of a bronze welded joint in an 18-in. cast-iron artesian well casing.

Bronze Welding of Cast Iron Pipe, H. R. Swartley. Acetylene Jl., vol. 26, no. 6, Dec. 1924, pp. 274-277, 4 figs. General discussion of process of bronze welding and recommendations for field application covering sizes of pipe and classes of service.

Welding Cast Pipe with Bronze, H. Y. Carson. Iron Trade rev., vol. 75, no. 2, July 10, 1924, pp. 97-98, 2 figs. In method developed by author for welding cast iron, an ordinary welding rod of tobin bronze is used, joint being preheated by playing an oxy-acetylene flame back and forth transversely across joint

area; bronze rod is melted and allowed to flow along joint, spreading about one inch in width entirely around pipe. Only moderate temperatures required. Abstract of paper read before Nat. Gas Assn. Am. See also Foundry, vol. 52, no. 12, June 15, 1924, pp. 469-470, 2 figs.

Chemical Engineering Processes Equipment. Oxy-Acetylene Welding in the Process Equipment Field. Chem. & Met. Eng., vol. 31, no. 9, Sept. 1, 1924, pp. 341-346, 9 figs. Some examples of spread of this method for fabrication and repair of apparatus used in chemical engineering industries.

Efficiency. Present State of Autogenous Welding and Cutting of Metals (L'état actuel de la soudure autogène et du découpage des métaux), M. R. Thomas. Société des Ingénieur Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 1-2-3, Jan.-Mar. 1924, pp. 182-201, 6 figs. Discusses methods of assembling and welding, welding rods, cutting, equipment, etc.

Gas Holders. See GAS HOLDERS, Oxy-Acetylene Welding.

Heavy Plate. Fabricating Heavy Plate by Oxy-Acetylene Welding. Boiler Maker, vol. 24, no. 3, Mar. 1924, pp. 63-67, 19 figs. Construction of two 1000-barrel oil-storage tanks, 125-ft. rotary kiln, and 50,000-cu. ft. gas holder.

Iron Castings. See IRON CASTINGS, Welding.

Iron Conduit Yokes. Welding Large Iron Castings with the Oxyacetylene Torch. Elec. Ry. Jl., vol. 63, no. 7, Feb. 16, 1924, pp. 245-246, 3 figs. The successful welding of conduit yokes by New York & Harlem R. R.; castings are heated with gas while they are being welded and afterward cooled slowly in annealing ovens; cost of reclaimed yoke one-sixth price of new one.

Locomotive Cylinders. See CYLINDERS, Locomotive, Welding.

Locomotive Fireboxes. Welding on Copper Fireboxes of Locomotives, J. F. Springer. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 293-294. Successful results obtained in Europe with oxy-acetylene torch and special filler rods.

See also LOCOMOTIVE BOILERS, Fireboxes.

Manganese Steel. Welding of Manganese Steel, S. W. Miller. Acetylene Jl., vol. 26, no. 2, Aug. 1924, pp. 65-71, 14 figs. Preliminary report of Gas Welding Committee of Am. Bur. Welding. Discusses what happens during welding of manganese steel, how actual operation may be best conducted and what structural results of welding are in both base metal and weld.

Medium High-Carbon Steel. Autogenous Welding. Ry. & Locomotive Eng., vol. 37, no. 7, July 1924, pp. 202-204, 4 figs. Investigation on steel of axles and wheels that fall under classification of medium high-carbon steel; rolled steel wheels, couplers, low-carbon steel, wrought iron, cast iron, cast-iron wheels, non-ferrous metal and torch cutting.

Methods. Cutting Manufacturing Costs by Means of the Oxy-Acetylene Blowpipe, Geo. E. Hagemann. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, pp. 509-512, 10 figs. Examples of work, based on data and photographs furnished by Linde Air Products Co.

Monel Metal. The Autogenous Welding of Monel Metal by the Oxy-Acetylene Process. Machy. (Lond.), vol. 24, no. 617, July 24, 1924, pp. 528-530, 12 figs. Discusses properties of monel metal, pressure of blowpipe, oxy-acetylene welding of rods, bars, sheets, plates and castings, and gives examples.

Non-Ferrous Metals. Oxyacetylene Welding of Non-Ferrous Metals, A. S. Kinsey. Am. Welding Soc.—Jl., vol. 3, no. 6, June 1924, pp. 27-51, 8 figs. Describes oxy-acetylene welding of copper, brass, bronze, aluminum, monel metal, nickel, and lead. Bibliography.

Plumbing and Heating Work. Welding in Plumbing and Heating, H. E. Wetzell. Welding Engr., vol. 9, no. 8, Aug. 1924, pp. 17-18, 3 figs. Work done in place with oxy-acetylene cutting and welding; joints, connections and special fittings economically welded.

Pressure Vessels. An Investigation of Welded Pressure Vessels. Am. Welding Soc.—Bul. no. 5, June 1924, 152 pp., 120 figs. Report of Pressure Vessel Committee of Am. Bur. of Welding covering recommendations to A. S. M. E. Boiler Code Committee, comments on construction, design, hydrostatic hammer test, welding wire, tests of welded specimens, marking and stamping, etc.

Railway Shops. Report on Autogenous and Electric Welding. Ry. Rev., vol. 75, no. 4, July 26, 1924, pp. 125-133, 23 figs. Gives results of investigations with reference to building up flat spots on steel and steel tired wheels, building up of worn collars at journal ends of axles, and welding of fractures in couplers; recommendations affecting gas and electric welding limits and regulations of report for 1919.

Welding Equipment in a Railroad Shop, J. S. Heaton. Ry. Mech. Engr., vol. 98, no. 7, July 1924, pp. 430-433, 6 figs. Modern tools should be provided so that operator may perform more accurate and efficient work.

Rotary Kilns and Coolers. Largest Oxy-Acetylene Welded Equipment Ever Built, R. R. Orwig. Acetylene Jl., vol. 25, no. 7, Jan. 1924, pp. 325-328, 6 figs. Experiences in oxy-acetylene welding of 8-ft. by 125-ft. rotary kilns and 5-ft. by 50-ft. coolers, installed at plant of Union Carbide Co., by Reeves Bros. Co. of Alliance, Ohio.

Structural Work. Oxy-Acetylene Welding and Cutting in the Structural Field, G. O. Carter. Am. Welding Soc.—Jl., vol. 3, no. 11, Nov. 1924, pp. 13-17, 4 figs. Considers several phases of situation of possibility of making a welded joint instead of a riveted connection; factors in making of good oxy-acetylene welds; use of bronze filler rods in place of steel in structural steel construction.

Tanks. Production Welding with Automatic Welding Machines. Acetylene Jl., vol. 26, no. 4, Oct. 1924, pp. 172-175, 5 figs. Discusses oxy-acetylene machine welding as applied to underground storage and other tanks.

Torch Uses. Variety of Torch Uses, C. W. Geiger. Welding Engr., vol. 9, no. 7, July 1924, pp. 22-25, 11 figs. Largest industrial firms on Pacific Coast use torch in many different and profitable ways.

Welders, Training. Training Course for Oxy-Acetylene Welders. Am. Welding Soc.—Bul. no. 4, Apr. 1924, 29 pp. Report of Committee on Training of Welding Operators of Am. Bur. of Welding.

OXYGEN

Cylinders for, Manufacture. The Manufacture of "Shelby" Seamless Steel Cylinders, J. L. Smith. Acetylene Jl., vol. 25, no. 7, Jan. 1924, pp. 329-332, 9 figs. Details of "cupping" method for manufacture of oxygen cylinders, accessory of oxy-acetylene welding and cutting equipment.

Electrolytic Generation. Catalytic Electrolytic Generation of Oxygen, C. G. Fink. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 566-567. Deals primarily with anodes that form protective film electrolytically.

Production of Oxygen Through Electrolytic Decomposition of Water (Gewinnung des Sauerstoffs durch elektrolytische Zersetzung des Wassers), T. Kautny. Autogene Metallbearbeitung, vol. 16, no. 24, Dec. 15, 1923, pp. 299-307, 14 figs. De-

scribes electrolytic plants and apparatus constructed by Schuckert & Co., and others.

Extraction from Atmosphere. A New Process for Extraction of Oxygen from Atmospheric Air (Eine neues Verfahren zur Gewinnung des Sauerstoffs aus der atmosphärischen Luft), Autogene Metallbearbeitung, vol. 17, no. 5, Mar. 1, 1924, pp. 63-67, 2 figs. Describes device used; a rotating magnetic field is main agent used for the purpose.

Liquefaction Production Process. Economical Plant for Producing Oxygen by the Liquefaction Process, A. G. Wikoff. Chem. & Met. Eng., vol. 30, no. 5, Feb. 4, 1924, pp. 181-184, 5 figs. Describes process and points out its economic advantages.

Liquid. See EXPLOSIVES, Liquid Oxygen; LIQUID OXYGEN.

Manufacture. See HYDROGEN, Manufacture.

Metallurgical Uses. Some Applications of Oxygen to Ferrous Metallurgy, F. W. Davis. Iron & Steel Engr., vol. 1, no. 6, June 1924, pp. 339-346 and (discussion) 346-351, 2 figs. Discusses application of oxygenated air in metallurgical presses, especially iron blast furnaces and ferroalloys, and results to be expected from its use.

Oxygen Regulators. Design and Construction of Gas Regulators, E. L. Mills. Acetylene Jl., vol. 25, no. 7, Jan. 1924, pp. 336-340, 6 figs. Deals with devices for regulating pressure and volume of gas in cylinder (as used by oxy-acetylene and oxy-hydrogen industries) up to torch.

Production and Uses. Production and Technical Use of Oxygen (Ueber die Gewinnung und technische Verwendung von Sauerstoff), B. Simmersbache. Wärme- u. Kälte-Technik, vol. 26, nos. 19, 20 and 22, Oct. 1, 15, and Nov. 15, 1924, pp. 181-182, 189-190, and 208-209. Reviews developments and patent literature, especially of liquid oxygen.

Uses in Cutting Metals. See CUTTING METALS.

OZONE

Cold Storage and. See COLD STORAGE, Ozone in.

Industrial Applications. The Industrial Applications of Ozone, F. E. Hartman. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 11, Nov. 1924, pp. 711-727, 8 figs. Data on production of ozone; ozonizer design; ozone in water purification, ventilation applications, use in bleaching operations, effect on linseed oil, etc.

Preparation and Uses. Ozone and Its Technical Applications, N. B. Lewis. Chem. Eng. & Min. Rev., vol. 16, no. 183, Dec. 5, 1923, pp. 105-107. History, occurrence, modes of preparation, preparation of pure ozone, properties, and uses.

Ozone (Ueber Ozon), G. M. Schwab. Zeit. für Physikalische Chemie, vol. 109, June 25, 1924, pp. 599-625, 6 figs. Discusses production of pure ozone; results of experiments show that liquid ozone and liquid oxygen are not miscible in all ratios.

Ventilation, Use in. Ozone and Its Use in Ventilation, F. E. Hartman. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 5, May 1924, pp. 365-382, 6 figs. Constitution of ozone; production; oxides of nitrogen; chemical properties of ozone; mechanical, or artificial, ventilation; temperature control; humidity control; air movement; odors; physiological effects; quantitative application.

OZONIZERS

High-Frequency Oscillations in. High-Frequency Oscillations in Siemens Ozonizers (Ueber Messungen an Ozonröhren), E. Warburg. Zeit. für technische Physik, vol. 5, no. 5, 1924, pp. 165-169, 1 fig. Gives particulars of measurements made with ozonizers of several diameters at frequencies of 50 to 500 when potential, resistance, and gas feed were varied.

P

PACKING

Boxes for. See BOXES.

Crate Design. Eleven Packing Problems and How They Were Solved, H. N. Knowlton. Factory, vol. 33, nos. 4 and 5, Oct. and Nov. 1924, pp. 515-519, 590 and 592, 15 figs.; and 662-664, 6 figs. Author gives his experience in redesigning crates for forge-manufacturing company; crating of telephone apparatus; crating heavy articles, such as automobiles, stoves, etc.

Refrigerating Machines. See REFRIGERATING MACHINES, Packing for.

PAINTING

Cars and Locomotives. Standards for Painting Cars and Locomotives. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 272-274. (Abstract.) Committee report submitted before Am. Ry. Assn., Equipment Painting Div.

The Possibilities of Mechanical Painting, J. W. Gibbons. Ry. Mech. Engr., vol. 98, no. 6 June 1924, pp. 360-362, 5 figs. Handicaps which have been overcome; increased protection of equipment against corrosion or decay.

Field Structures. How Should Field Structures Be Painted? Contract Rec. & Eng., vol. 38, no. 2, Jan. 9, 1924, pp. 26-29. Formulas for whitewash and cold water paints that may be used by contractors for either interior or exterior painting of field offices, bunk houses, camp structures, and similar buildings.

Industrial Plant Practice. Modern Maintenance of Plant and Equipment, Wm. G. Zeigler. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 24-31, 11 figs. Discusses paint and its manifold uses.

Standardization of Painting Practice, R. C. Sheeler. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 25-28, 5 figs. Extremes of moisture or steam cause all metal surfaces to rust and corrode with extreme rapidity; other surfaces come in contact with gaseous fumes, weak acid vaports, etc. Much money wasted and much good paint condemned through use of wrong material for protective coat to withstand such contact. Discusses application of standardization to maintenance of plant and equipment through proper use of paint and varnish.

Iron and Steel. See IRON AND STEEL, Painting.

Ships. The Use of Paint at Sea. Pac. Mar. Rev., vol. 21, no. 7, July 1924, pp. 371-372 and (advt. sec.) 41 and 44, 1 fig. Analysis showing types of paint best adapted for various portions of hull and best methods of applying same.

PAINTS

Aluminum. Some Observations on Aluminum Paints, P. H. Walker and E. F. Hickson. Chem. & Met. Eng., vol. 31, no. 18, Nov. 3, 1924, pp. 693-696, 12 figs. Tests showing how and when aluminum paints can be used most satisfactorily.

Aluminum and Bronze Powders for. See ALUMINUM, Powders, Manufacture.

Cadmium, Use in. See CADMIUM, Application of.

Colloidal Lead Suspension. A New Lead Paint, R. Ditmar. Chem. & Met. Eng., vol. 31, no. 20, Nov. 17, 1924, p. 775. Colloidal suspension of metallic lead in linseed oil forms effective protective coating; material is being marketed in Europe under name of Subox; when applied to iron, metals, wood, cardboard, cement, etc., it is claimed that firmly adhering film of metallic lead is obtained on coated material after suspension agent has become dry.

Colloidal Reaction, Effect of. Phenomena in Paints and Varnishes Induced by Colloidal Reactions, H. A. Gardner. Paint Mfrs.' Assn. of U. S.—Sci. Section, no. 200, Mar. 1924, pp. 279-293. Wetting and grinding phenomena; texture of pigments; absorption phenomena; plasticity and yield value; electrical charge on pigments; viscosity and surface-tension effects, etc.

Fire-Resisting. Protection Against Fire (Vorbeugender Feuerschutz), Schrüffer. Schiffbau, vol. 25, no. 30, Dec. 24, 1924, pp. 885-887, 3 figs. Details of tests made by Berlin Materialprüfungsamt with gronid, a protective paint of high fire-resisting properties.

Heat-Absorption-Reducing. Paints of High Luminosity to Reduce Refrigeration Losses, H. A. Gardner and H. C. Parks. Paint Mfrs.' Assn. of U. S. Sci. Sec.—Circular no. 213, Sept. 1924, pp. 82-84, 2 figs. Suggests use of white or light tints for refrigerating cars or ships to reduce heat absorption.

Heat-Insulation Value of. Insulation Value of Paint and Its Effect in Reducing Condensation, H. A. Gardner. Paint Mfrs.' Assn. of U. S., Sci. Sec.—Circular no. 212, Sept. 1924, pp. 80-81, 1 fig. Shows insulating power by metal pipes carrying cold water in warm room, painted parts of which show no condensation.

Luminous. Luminous Paints and Their Technical Use (Radioaktive Leuchtfarben und ihre technische Anwendung), M. Wolf. Licht u. Lampe, no. 12, June 5, 1924, pp. 311-314, 8 figs. Discusses radio, radio-thorium, and mesothorium luminous paints and their many applications.

Metal-Protective. Paints for Metals, H. A. Gardner. Paint Mfrs.' Assn. of U. S.—Circular no. 202, Apr. 1924, pp. 302-327, 10 figs. Review of tests with suggestions regarding design and use of metal protectives.

Pigments. See PIGMENTS.

Pigments and Varnish in, Action of. Action of Pigment and Varnish in Paints for Protection from Rust (Ueber die Wirkung von Farbkörper und Firnis in Rostschutzfarben), P. Herrmann. Zentralblatt der Bauverwaltung, vol. 44, nos. 47 and 48, Nov. 19 and 26, 1924, pp. 411-414 and 421-422, 8 figs. Details of tests carried out with varnishes showing that linseed oil without pigment gives no protection whatever; pigments must be insoluble in water; red lead, zinc white, talcum, white lead, kaolin and iron mica are practically waterproof.

Protective Properties. The Protective Properties of Paint, W. T. Pearce. Chem. & Met. Eng., vol. 30, no. 12, Mar. 24, 1924, pp. 463-467, 10 figs. Scientific investigations at North Dakota Agricultural College; formulation of test paints; factors affecting durability.

Railway Buildings. Paints for Railway Buildings. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 557-559. Appendix C, report of Buildings Committee of Am. Ry. Eng. Assn. presented for approval for publication in manual.

Red Lead. Some Observations on Red Lead as a Paint Pigment, E. F. Hickson and H. R. Snoke. Paint Manufacturers' Assn. of U. S., Sci. Sec.—Circular no. 207, July 1924, pp. 47-60, 6 figs. Discusses flow test used in conjunction with brush test for determining painting qualities of red lead.

Rust-Preventive. Paint as a Rust Preventative, R. C. Sheeler. Indus. Mgmt. (N. Y.), vol. 68, no. 4, Oct. 1924, pp. 229-232, 3 figs. Importance of right kind of paint for iron and steel surfaces.

Sulphide-Fumes-Resistant. Paints Resistant to Sulfied Fumes, P. H. Walker and E. F. Hickson. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1142-1143. Results of investigation of 25 paints subjected to tests.

Varnishes. See VARNISHES.

White. The Effect of Inert Fillers upon the Properties of White Paint: Development of a Paint for Plant Purposes, S. W. Ross. Australasion Inst. Min. & Metallurgy—Proc., no. 53, Mar. 31, 1924, pp. 1-14, 16 figs. Investigation to determine best combination of pigments and fillers for use as outside white paint on plant buildings.

White-Lead Manufacture. A Typical Problem in Chemical Engineering Development, J. H. Calbeck. Chem. & Met. Eng., vol. 31, no. 24, Dec. 15, 1924, pp. 920-924, 12 figs. Difficulties solved in developing commercial process that greatly improved quality and output of sublimed white lead.

Manufacture of White Lead (Fabrication de la Céruse), N. Chercheffsky. Chimie & Industrie, vol. 11, no. 1, Jan. 1924, pp. 45-48. Observations on the Dutch process; average yield of white lead is about 50 per cent of gross weight of lead taken; under abnormal conditions it may be as low as 27 to 28 per cent, but under favorable conditions it may attain 67 to 68 per cent.

White-Lead Substitutes. White Lead Substitutes (Ueber Bleiweissersatzmittel), J. F. Sacher. Zeit. für angewandte Chemie, vol. 37, no. 38, Sept. 18, 1924, pp. 732-735. Advantages of white lead. Discusses basic lead chloride, titanium white, zinc oxide, lithopone, and Hessian white, consisting of 81.23 per cent lithopone and 17.65 per cent zinc oxide, as substitutes.

Wood Preservatives. See WOOD PRESERVATION, Paint as Preservative.

PANAMA CANAL

[See also CANALS, Panama; FLOODS, Panama Canal.]

Salinity of. Salt Water Climbs the Locks of the Panama Canal, R. Z. Kirkpatrick. Eng. News-Rec., vol. 92, no. 22, May 29, 1924, pp. 935-936, 1 fig. Up-lockage brings seawater into Miraflores Lake; tests of salinity; conditions controlling increase.

PAPER

Abrasive. See ABRASIVES, Papers and Cloths.

Analysis of. Analysis of Coated Papers. Paper, vol. 34, no. 2, May 1, 1924, pp. 48-51. Methods available to paper chemists for ready determination and estimation of binding materials and surface coatings used in manufacture of coated paper.

Rapid Analysis of Paper. Paper, vol. 33, no. 25, Apr. 10, 1924, pp. 11-12, and vol. 34, no. 3, May 8, 1924, pp. 87-89. Factors that influence character of paper in beating process; determination of degree of sizing in paper; tests for rosin in paper fibers. Necessary conditions in analysis of sizing substances and description of methods employed. From Moniteur de la Papeterie Française.

Cellulose, Electrical Properties of. The Electrical Properties of Various Cellulose Papers (Ueber einige elektrische Eigenschaften verschiedener Zellulose-Papiere), U. Retzow. Kunststoffe, vol. 14, no. 2, Feb. 1924, pp. 20-24, 3 figs. Simple

method for testing electrical properties of papers. Influence of humidity and paraffin impregnation emphasized.

Inkfastness Testing. Testing Inkfastness of Paper, N. A. Stephens. Paper, vol. 34, no. 25, Oct. 9, 1924, pp. 1142-1144, 3 figs. Methods for testing degree of sizing or determining inkfastness of paper, with account of a new electrolytic apparatus.

Insulating. Some Notes on Insulating Papers, A. I. Macnaughton. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 929-931, 4 figs. Manufacture of paper; paper machine; insulating papers; dry-core cables for telephone work.

See also INSULATING MATERIALS, ELECTRIC, Paper, Bakelized; Varnish Paper.

Machinery. See PAPER MACHINERY.

Manufacture. See PAPER MANUFACTURE.

Sizing-Quality Destruction. The Destruction and Restoration of Sizing Quality in Paper, N. D. Ivanov. Paper Trade Jl., vol. 79, no. 2, July 10, 1924, pp. 41-44, 10 figs. Details of experiments made in connection with phenomenon of destruction of sizing quality by sunlight. Translated from Bumazhnaia Promyshlenost (Russian).

Testing. Discussion of Standard Atmospheric Conditions for Paper Testing, R. O. Reed. Paper Trade Jl., vol. 78, no. 9, Feb. 28, 1924, pp. 45-46.

Testing Waterproofed Paper, F. T. Carson. Paper Trade Jl., vol. 79, no. 10, Sept. 4, 1924, pp. 48-50, 2 figs. Describes common methods of testing water resistance, and proposes new method which employs a ground glass surface to hold transuded moisture in a film which is plainly visible since it renders glass more transparent at that point. Pub. by permission U. S. Bur. Standards.

The Testing of Paper, E. O. Reed. Paper, vol. 35, no. 7, Dec. 4, 1924, pp. 269-272. Effect of temperature and relative humidity on folding endurance of paper, with a discussion of testing conditions.

PAPER INDUSTRY

Lubrication in. Lubrication in the Paper Industry. Lubrication, vol. 10, nos. 10 and 11, Oct. and Nov. 1924, pp. 109-120 and 121-122, 37 figs. Oct.: Preparation of raw product. Nov.: Conversion of pulp to paper.

Power Regulations. Power Factor Correction and Regulation as Applied to the Pulp and Paper Industry, W. W. Spratt. Paper Mill, vol. 48, no. 29, July 19, 1924, pp. 4-9 and 50, 10 figs. Discusses power factor in relation to various plants; selection of motors for mills, machines to be driven, and horsepower ratings, and speeds.

Sweden. The Development of the Swedish Pulp and Paper Industrie (Die Entwicklung der schwedischen Holzschliff-, Zellstoff- und Papierindustrien), Fr. Grewin. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 14, Apr. 5, 1924, pp. 343-347. Sweden's role in modern development of paper manufacture; most important manufacturing processes; progress in Swedish paper industry; production of Swedish pulp, cellulose, and paper industry.

Water Power. Water Power in Pulp and Paper Industry in Canada. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 69-72, 1 fig. Low cost power essential to industry; general conditions in each province; construction activities; future power requirements of industry.

PAPER MACHINERY

Beaters. Beating and Refining Engine. Paper, vol. 34, no. 20, Sept. 4, 1924, pp. 899-900, 2 figs. Describes combined beating and refining engine invented by Sheldon Leicester, designed to produce a continuous flow of stock, beaten as to length, hydration, and flexibility (1) by regulating speed of motor, (2) by set of bedplates, and (3) by dilution of stock.

Shartle Continuous Beater. Paper, vol. 34, no. 2, May 1, 1924, pp. 38-39, 8 figs. Describes new invention providing a battery of beaters for continuous operation in combination with raw stock breaker for manufacture of paperboard.

Calenders. Hardness of Paper Rolls in Calenders. Paper, vol. 34, no. 13, July 17, 1924, pp. 563-564, 1 fig. Good glazing effects influenced by hardness of paper rolls; mathematics of pressure exerted on them.

Driers. Caterpillar Paper Dryer, J. W. Brassington. Paper, vol. 34, no. 25, Oct. 9, 1924, pp. 1135-1137, 1 fig. General characteristics and advantages claimed for new type of dryer in which water is boiled out of paper between felt surfaces. Cylindrical surfaces of standard paper machine dryer are replaced by straight line heating surfaces.

The Vacuum Paper Machine Dryer, O. Minton. Paper, vol. 33, no. 26, Apr. 17, 1924, pp. 5, 52-54, 56, 58, 60-62 and 64, 11 figs. Detailed description of Minton drier and its operation. See also Paper Mill, vol. 48, no. 15, Apr. 12, 1924, pp. 90, 92, 94, etc.

Finishing-Room Machinery. Finishing Room Machinery, O. C. Cordes and W. W. Spratt. Paper, vol. 34, no. 10, June 26, 1924, pp. 422-425, 8 figs. Describes and illustrates operation of calender drives, platers and cutters by Westinghouse dual-frequency system.

Newsprint Machines. Anti-Friction Bearings on High-Speed Newsprint Machines, G. H. Spencer. Paper Trade Jl., vol. 78, no. 22, May 29, 1924, pp. 46-49, 11 figs. See also Wood Pulp News, vol. 48, no. 23, June 7, 1924, pp. 16, 18, and 38, 8 figs. Fundamentals of plain and of anti-friction bearings; and advantages of anti-friction bearings.

High Speed Machine Construction, E. J. Neese. Paper, vol. 34, no. 10, June 26, 1924, pp. 428-431. Increased width and speed of newsprint machines bring many improvements in design and construction.

Newsprint Production. Electrician, vol. 92, no. 2396, Apr. 18, 1924, p. 485, 2 figs. Describes 164-in. high-speed electrically driven paper machine built by Gagley and Sewall Co. and equipped with Westinghouse sectional drive.

The Modern News Print Machine, A. N. Russell. Paper Mill, vol. 48, no. 22, May 31, 1924, pp. 26, 28, and 30. Discusses recent improvements, including Fourdriniers, improvements in press sections and in dryer section, etc.; advantages to be derived from driving paper machines by sectional electric drive.

Types. Paper-Making Machines, M. Wintermeyer. Eng. Progress, vol. 5, no. 12, Dec. 1924, pp. 255-260, 6 figs. Newspaper machines with high-pressure feed of material and withdrawable strainer section; machines for fine papers, medium fine papers, and papers with one-sided gloss; automatic delivery machines; round strainer machines; long strainer pasteboard machines.

Wood Grinders. Development in Wood Grinders Towards Achieving Highest Efficiency in Producing Mechanical Pulp, O. J. Goeppinger. Paper Trade Jl., vol. 78, no. 2, Jan. 10, 1924, pp. 43-48, 13 figs. Review of history of wood pulp grinding; construction and operation of caterpillar grinder; various methods of pulp grinding and their relation in producing uniform pulp; advantages of continuously operating grinders.

How Caterpillar Grinders Operate. Paper, vol. 34, no. 12, July 10, 1924, pp. 516-517, 8 figs. Essential features of magazine wood grinder invented by P. Priem, Heidenheim, Germany, which is now owned and controlled by Am. Voith Con-

tact Co., Inc., New York. Endless-chain device presses wood laterally as it nears stone, and feed mechanism is driven by fluid motor.

Magazine Grinders and Continuous Grinders (Magazinschleifer und stetige Schleifer), F. Hoyer. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 29, July 19, 1924, pp. 757-750, 7 figs. Discusses high power magazine grinders, continuous grinders in which wood is fed without interruption, improvement on magazine grinder, produced by J. M. Voith in Heidenheim.

New Type Magazine Grinder. Paper, vol. 34, no. 26, Oct. 16, 1924, pp. 1188-1193, 13 figs. Describes new magazine grinder invented by J. J. Warren, of Brownville, N. Y., believed to be improvement on previous forms.

PAPER MANUFACTURE

Beating. New Ideas on Beating, J. W. Brassington. Paper, vol. 34, no. 11, July 3, 1924, pp. 461-464, 3 figs. More speed and less weight of rolls is suggested in describing new type of beater using centrifugal force.

Simplicity in Research, A. B. Green. Paper, vol. 33, no. 25, Apr. 10, 1924, pp. 6-10, 6 figs. Study of beater action of effect of beater roll on pulp; control of variable of beating and measurement of its progress by use of beater drag.

Bibliography. Bibliography of Papermaking for 1923, compiled by C. J. West. Paper Trade Jl., vol. 78, nos. 17, 18, 19, 20, 21, 22, 23, 24, and 25, Apr. 24, May 1, 8, 15, 22, 29, June 5, 12, and 19, 1924, pp. 52-54, 49-54, 53-56, 49-52, 45-47, 51-52, 55-57, 45-46, and 41-43.

Bleach Requirements of Pulp. Determination of the Chlorine Absorbed by Unbleached Sulfite Pulp, R. B. Roe. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 808-811, 1 fig. Apparatus and method used in determination of chlorine as absorbed by wide range of unbleached sulphite pulps.

Bleaching Beaters. Function of the Washing Drum, Haas. Paper, vol. 34, no. 11, July 3, 1924, pp. 471-475, 6 figs. Determines consumption of energy and best method of operating washing drum of bleaching beater. Translated from Papierfabrikant.

Cardboard. Fine Cardboard Making, H. Postl. Paper, vol. 34, no. 23, Sept. 25, 1924, pp. 1043-1045. Furnishes and processes for ivory and alabaster cardboards used in German mills, with notes on adhesives and drying methods.

Cellulose. See CELLULOSE.

Chromo Paper. Special Moistening of Chromo Paper, E. Arnould. Paper Trade Jl., vol. 78, no. 14, Apr. 3, 1924, pp. 79-80. Notes on manufacture of chromo paper; moistening of paper as it is being reeled. Translated from Revue Universelle de la Papeterie et de l'Imprimerie.

Clay as Filler. Comparison of American and Foreign Clays as Paper Fillers, M. B. Shaw and G. W. Bicking. U. S. Bur. Standards—Technologic Papers, no. 262, Aug. 20, 1924, pp 337-380, 23 figs. Results of study as to amount of clay retained in paper, quality of paper produced, and those physical properties of clay that might affect paper-manufacturing processes. Bibliography.

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See also Pulp; WOOD PULP.

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Details of Paper-Mill Drives and Power Service, H. E. Stafford. Indus. Engr., vol. 82, no. 8, Aug. 1924, pp. 360-367 and 400-401, 11 figs. Includes transformation and distribution of electric power throughout mill, together with types of motors and kinds of drive used to connect motors to their loads, and characteristics of paper-mill loads.

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Lignone Dust Explosions. See EXPLOSIONS, Lignone Dust.

Machinery, Bearings for. See BEARINGS, Paper-Mill Machinery.

Machinery for. See PAPER MACHINERY.

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PARSONS LINE. See BOILER OPERATION, Parsons Line; CENTRAL STATIONS, Parsons Line; STEAM TURBINES, Parsons Line.

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Needed Reforms in the Patent System, Thos. A. Hill. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 681-684. Points out important shortcomings of present American patent system, presents facts and suggestions.

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PATTERNMAKING

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PATTERNS

Automotive, Drafting of. Automotive Pattern Drafting, W. Scholl. Sheet Metal Worker, vol. 14, no. 25, and vol. 15, nos. 2, 3, 7, 9, and 11, Jan. 4, Feb. 15, Mar. 15, Apr. 25, May 23, and June 20, 1924, pp. 940-941 and 979, 41-43, 114-115 and 143-144, 240-241, 329-330 and 348 and 414-415, 32 figs. How to lay out patterns for pressed steel radiator splash shield, and hood top and sides which are pressed to shape.

Fillets, Use of. Many Types of Fillets Used, W. C. Ewalt. Foundry, vol. 52, no. 22, Nov. 15, 1924, pp. 904-905, 13 figs. Reasons for their use; kinds of fillets which are best to use.

Metal Gear Patterns. Metal Gear Patterns, J. F. Hines. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 692-693, 4 figs. Metal patterns of type shown are especially satisfactory for casting spur and bevel gears; details of construction; making patterns.

Plaster. Patterns Are Made of Plaster, W. C. Ewalt. Foundry, vol. 52, no. 23, Dec. 1, 1924, pp. 945-946, 6 figs. Material is used by patternmaker chiefly to make master patterns and core-boxes; care must be taken in mixing plaster.

Standardization. Preliminary Experiments on the Standardisation of Patterns, O. Querut. Foundry Trade Jl., vol. 30, no. 436, Dec. 25, 1924, p. 541. Author considers that standardization of patterns is intimately connected with that of cast machine parts, and that latter investigation is still in earliest stages; concludes that it is necessary at first to limit standardization to certain features common to all patterns. (Abstract.) Translated from paper presented before Assn. Technique de Fonderie.

Wheel. Quickly-Made Wheel Patterns, J. Edgar. Metal Industry (Lond.), vol. 25, nos. 5 and 6, Aug. 1 and 8, 1924, pp. 107-109, and 131-132, 8 figs. Describes use of odontograph in marking out gear teeth and subsequent construction of pattern.

PAVEMENTS

Asphalt. See PAVEMENTS, ASPHALT.

"Black Base" Construction. "Black Base" Construction in Mercer County, N. J., H. F. Harris. Good Roads, vol. 67, no. 1, July 1924, pp. 12-14, 3 figs. See also Highway Engr. & Contractor, vol. 11, no. 3, Sept. 1924, pp. 27-30, 4 figs. "Blase base" pavement was constructed on foundation of stone, which was taken from excavated material, and topped with regular standard sheet asphalt pavement 1½ in. thick. Up to present time "black base" work has shown no cracks and is to all intents and purposes in every respect equal to standard practice in constructing sheet asphalt with rigid base.

Brick. See PAVEMENTS, BRICK.

Concrete. See PAVEMENTS, CONCRETE.

Foundations. Relation of Depth of Foundations of Pavements to Their Strength, C. D. Pollock. Am. City, vol. 30, no. 1, Jan. 1924, pp. 11-13. Improving Subgrade vs. heavier foundation; damage from swelling of subsoil. (Abstract.) Paper read before Am. Soc. Mun. Improvements.

Roughness. Roughness as a Factor in Pavement Life, A. T. Goldbeck. Can. Engr., vol. 46, no. 9, Feb. 26, 1924, pp. 275-278 and 282, 5 figs. See also Eng. & Contracting (Roads & Streets), vol. 61, no. 2, Feb. 1924, pp. 306-316, 12 figs. Cause and effect of various types of road surface roughness; calculating pressure on surfaces; measurement of impact and fiber stresses; devices for measuring roughness.

Rubber-Block. Interlocked and Nailed Rubber Pavement, E. Swanson. India Rubber Wld., vol.

70, no. 6, Sept. 1, 1924, p. 783, 4 figs. Effective attachment needed to overcome traction wave; gives two practical suggestions; interlocking rubber blocks.

Rubber Street Pavement Laid in Boston. India Rubber Wld., vol. 70, no. 3, June 1, 1924, pp. 571-572, 3 figs. Boston, Mass., becomes pioneer American city to try out rubber paving blocks. Racine, Wis., railroad crossing experiment and Harvard bridge project.

Salva. Salva Street Paving (Salva-Strassenbelag), O. Salvisberg. Städtereinigung, vol. 16, no. 12, June 15, 1924, pp. 93-94. Salva, also known as tar-stone, consists of sand and broken stone of 2-20 mm. and specially prepared tar or bituminous products as a binder; they are thoroughly mixed and formed into bricks under high pressure.

Statistics. Additional Paving Tables. Pub. Wks., vol. 55, no. 3, Mar. 1924, pp. 96-100. Areas now in use, areas laid during 1923 and cost thereof, of plain or water-bound macadam, gravel, and concrete pavements as reported in February by several hundred cities.

Street Paving Tables. Pub. Wks., vol. 55, no. 2, Feb. 1924, pp. 64-74. Replies to questionnaire, giving amount of each kind of pavement in use, and that laid in 1923 and cost of it, in each of nearly 500 cities; also details of sidewalk design, including radius of curb corners.

Stone-Block. See PAVEMENTS, STONE-BLOCK.

Surface Testing. Illinois Tests Pavement Surfaces by Profilometer, H. F. Clemmer. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 484-485, 3 figs. 16-wheel carriage hauled over pavement inscribes graph and casts up sum of vertical irregularities.

PAVEMENTS, ASPHALT

Construction. Asphalt in Modern Highway Construction, F. P. Smith. Good Roads, vol. 66, nos. 4 and 5, Apr. and May 1924, pp. 98-100 and 130-132. Growth of asphalt industry since first sheet asphalt pavement was laid in 1870 near City Hill in Newark, N. J., down to present time. The various types of asphalt construction now in use, and their special application. Asphaltic surface mixtures.

Local Materials for. Local Materials for Pavements, R. M. Green. Can. Engr., vol. 46, no. 4, Jan. 22, 1924, pp. 175-176. Economic advantages of selecting types of asphalt pavements with reference to local materials; engineer should exercise judgment in preparing specifications.

Mixtures. Plant Inspection of Asphaltic Paving Mixtures, W. J. Emmons. Good Roads, vol. 66, nos. 1 and 2, Jan. and Feb. 1924, pp. 5-8 and 21, and 47-50 and 58, 5 figs. Arguments in favor of plant inspection; suggestions regarding inspection of materials, such as plant laboratory and equipment, duties of inspector, storage of materials, etc.; suggestions regarding process of combination.

Status of Design of Sheet Asphalt Mixtures, M. F. Macnaughton. Can. Engr., vol. 46, no. 15, Apr. 8, 1924, pp. 419-420. Composition of sheet asphalt surface mixtures; relationship between bitumen content and type of aggregate employed; development of Montreal mixture from Richardson's formulas. Paper read at Tenth Highway Conference, Univ. of Mich.

Sand-Asphalt. Development of Bituminous Base and Sand-Asphalt Pavements, E. R. Oldbrich. Highway Engr. & Contractor, vol. 10, no. 2, Feb. 1924, pp. 55-60, 11 figs. See also Eng. & Contracting (Roads & Streets), vol. 61, no. 2, Feb. 6, 1924, pp. 331-336, 4 figs. Describes methods and costs in North Carolina.

Types of. The Design and Construction of Asphalt Pavements, P. Hubbard. Mun. & County Eng., vol. 66, no. 5, May 1924, pp. 221-229. Constituents and types of asphalt pavements; asphalt macadam; asphaltic concrete; sheet asphalt; hot-mix construction; asphalt block; foundations; subgrades; traffic tests on various designs of pavements.

Warrenite-Bitulithic. Review of the Quarter Century Development of Warren Roadway Construction, Geo. C. Warren. Mun. & County Eng., vol. 66, no. 1, Jan. 1924, pp. 34-39, 6 figs. Early development of defects; Wallace invention; asbestophalt and asbestos-bitulithic; natural rock asphalt surfacing; dense mixed asphaltic concrete base; Warrenite-bitulithic surfacing.

PAVEMENTS, BRICK

Design. Important Principles of Brick Pavement Design with Recommendations, W. D. P. Warren. Mun. & County Eng., vol. 67, no. 2, Aug. 1924, pp. 55-64, 1 fig. Treats of original conditions and factors which governed early design, emphasizes changed conditions, and discusses design of brick pavement considered as engineering structure.

PAVEMENTS, CONCRETE

Accelerated Wear Tests. Accelerated Wear Tests of Concrete Pavements, F. H. Jackson and J. T. Pauls. Eng. & Contracting (Roads & Streets), vol. 62, no. 2, Aug. 6, 1924, pp. 302-313, 2 figs. Report of tests by U. S. Bur. Public Roads.

Construction. Concrete Pavement Construction in Wilbarger County, Texas, J. B. Nabers and E. L. McHugh. Eng. & Contracting (Roads & Streets), vol. 61, no. 1, Jan. 2, 1924, pp. 22-25, 5 figs. Unusual design and construction features of work carried out in 1923.

Construction of Concrete Pavements, H. C. Boyden. Can. Engr., vol. 47, no. 3, July 15, 1924, pp. 157-160. See also Eng. & Contracting (Roads & Streets), vol. 62, no. 3, Sept. 1924, pp. 537-543, 7 figs. Review of present day practices; quality of aggregate; uniform water-cement ratio; design of section; longitudinal center joint; construction methods.

Frictional Resistance. See CONCRETE, Friction Tests.

Impact on. Impact on Concrete Pavements. Pub. Works, vol. 55, no. 7, July 1924, pp. 221-223, 3 figs. Tests made by Bur. Pub. Roads using specially devised machine, and conclusions drawn from them.

Reinforcement. Concrete Pavement Reinforcement Logically Designed, Geo. D. Burr, C. Older and A. T. Goldbeck. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 78-81, 2 figs. Design for King County roads based on Bates Road, Pittsburg Road, and Arlington tests; discussed by engineers of Bates Road and chief of tests of Bur. of Pub. Roads.

Weighing Aggregates for. Weighing Concrete Aggregates for Highway Pavements, R. W. Crum. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 89-91, 6 figs. Iowa Highway Commission has adopted actual weighing of aggregates on road pavement construction; quality in modern highway pavements is highly desirable and any economical method of attaining high degree of quality should be adopted; investment in hard surface pavements should be safeguarded by best methods of construction; materials used should not be abused by careless treatment.

PAVEMENTS, STONE-BLOCK

Dayton, Ohio. Stone Block Pavements in Dayton, Ohio, I. E. Houk. Engineer, vol. 137, no.

3570, May 30, 1924, pp. 606-607, 5 figs. States that Dayton's stone-block pavements have stood test of continuous heavy traffic better than any other type; methods and types of blocks employed.

PEAT

Bog Reclamation. See RECLAMATION, Peat Land.

Distillation. Processes for the Treatment of Peat and Lignite (Les procédés de traitement de la tourbe et du lignite), M. Migeon. Chimie & Industrie, vol. 11, no. 2, Feb. 1924, pp. 248-255, 7 figs. Describes process and producer, known as gazefactor, developed by author; and discusses relative values of vertical- and horizontal-retort processes for distillation of lignite.

Drying. Drying Peat with High Percentages of Moisture, J. W. Brassington. Power House, vol. 17, no. 10, Oct. 5, 1924, pp. 21-23, 1 fig. Modified type of paper-drying machine advocated as practical and fool-proof; makes peat a successful competitor of other fuels.

The Drying of Peat for Power Production, G. K. Fletcher. World Power, vol. 2, no. 9, Sept. 1924, pp. 156-163. Considers possibilities of using peat for purposes of power production.

Hydropeat. Coagulation of Hydropeat by Means of Gypsum and Its Effect on the Rate of Dehydration and the Condition of the Drying Beds (Die Koagulierung von Hydrotorf mit Gips und ihr Einfluss auf die Entwässerungsgeschwindigkeit und den Zustand der Trockenfelder), Geo. Stadnikoff and E. Iwanowsky. Kolloid-Zeit., vol. 35, no. 3, Sept. 1924, pp. 174-178, 3 figs. Hydropeat which has been coagulated by addition of solution of gypsum loses water by filtration through natural peat bed more rapidly than uncoagulated hydropeat, and does not show tendency of latter to block up bed; at same time gypsum solution has coagulating effect on peat bed in its passage through it.

Mining. Modern Peat Mining Processes (Neuzeitliches Torfgewinnungsverfahren). Technische Blätter, vol. 14, no. 29, July 19, 1924, pp. 219-220, 4 figs. Details of Maus presses for economic elimination of most of water by gradually increasing pressure, conserving natural fiber.

Oil and Coke Recovery. Oil and Coke Recovery From Peat (Möglichkeiten der Oel und Koksgewinnung aus Torf), W. Domnick. Petroleum, vol. 20, no. 34, Dec. 1, 1924, pp. 1891-1895, 3 figs. Particulars of new plant for briquetting peat, with peat coke of 84 per cent carbon, crude oil, paraffin, and pitch as by-products.

Power Production, Utilization for. The Utilization of Peat for Power Production, G. K. Fletcher. World Power, vol. 2, no. 7, July 1924, pp. 19-22. Discusses difficulties arising from moisture content, cost and advantages of peat production.

Preparation and Briquetting. New Process of Preparing Briquetting Peat, R. Schade. Iron & Coal Trades Rev., vol. 109, no. 2952, Sept. 26, 1924, p. 520. Outlines new German method of peat preparation, by which not only water in peat, but also sugar contained in it, are separated.

Production, United States, 1923. Peat in 1923, K. W. Cottrell. U. S. Geol. Survey (Mineral Resources of U. S.), no. 11:8, Sept. 27, 1924, pp. 69-70. Statistics of production.

PENDULUMS. See CLOCKS.

PENSIONS

Old-Age. Present Status of Old-Age Pension Legislation in the United States, A. Epstein. Monthly Labor Rev., vol. 19, no. 4, Oct. 1924, pp. 26-33. Present provision for poor relief; efforts toward old-age pension legislation; provisions of laws already passed; opposition and its results.

PERMALLOY. See CABLES, ELECTRIC, Permalloy-Loaded.

PERMEAMETERS. See ELECTRIC MEASURING INSTRUMENTS, Permeameters; MATERIALS, Magnetic Properties, Testing of.

PETROLEUM

[See also OIL.]

Bituminous Sands. See BITUMINOUS SANDS, Alberta, Canada.

Boiling Point. See LIQUIDS, Boiling-Point Correction Chart.

Cracking. See OIL, Cracking.

Distilling. See OIL, Distillation.

Industry. See OIL INDUSTRY.

Metals, Catalytic Influence on. See MINERAL OILS.

Occurrence. See OIL FIELDS.

Oil Fields. See OIL FIELDS.

Refinery Laboratory. See LABORATORIES, Petroleum Refinery.

Refining. See BAUXITE, Petroleum Refining Agent, Use as; LUBRICATING OILS, Manufacture; OIL, Refining.

Resources. See AUTOMOBILE FUELS, Resources and Supplies.

Rumanian Laws. See MINING LAWS, Petroleum Exploitation and Storage.

Still for. See DISTILLATION, Stills.

PETROLEUM INDUSTRY. See OIL INDUSTRY.

PHONOGRAPHS

Matrices. See ELECTROPLATING, Phonograph Matrices.

PHOSGENE

Determination. See GASES, Phosgene in Mixtures.

PHOSPHATE ROCK

Tennessee. Geology and Utilization of Tennessee Phosphate Rock, R. W. Smith. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1373-M, Sept. 1924, 20 pp., 5 figs. Brief history of phosphate industry of Tennessee. Describes distribution and origin, mining, treatment, and uses; gives costs of production.

PHOSPHATES

Acid, Production. See FERTILIZERS, Acid Phosphate Production.

Detection of Metals in. Detection and Determination of Metals Present in Small Amounts in Natural Phosphates (Etude sur les phosphates naturels), A. Grammont. Société Chimique de France—Bul., vol. 35-36, no. 10, Oct. 1924, pp. 1351-1354. Copper, nickel, and zinc were detected and amounts present determined in number of naturally occurring phosphates; ordinary separation methods for these metals are applicable to their quantitative determination in these minerals.

Metallurgical Uses. Utilization of Natural Phosphates in Metallurgy (L'utilisation des phosphates naturels en sidérurgie), S. Brull. Technique Moderne, vol. 16, no. 5, Mar. 1, 1924, pp. 138-143, 2 figs. Study of rôle of phosphates in metallurgical industry; characteristics of different phosphates; technical conditions governing selection; calculation of influence of silica on value

of phosphate; presence of fluorine in rich phosphates.

PHOSPHORIC ACID

Manufacture. Manufacture of Phosphoric Acid by the Volatilization Process, Wm. H. Waggaman. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 176-179, 8 figs. Advantages over sulphuric-acid method; technical problems.

Pyrolytic Production Process. The Future of the Pyrolytic Process for Phosphoric Acid, W. H. Waggaman and H. W. Easterwood. Chem. & Met. Eng., vol. 30, no. 11, Mar. 17, 1924, pp. 432-435, 5 figs. Theory of volatilization process; electric and fuel furnaces as two alternative methods; it appears that this method will eventually supplant sulphuric-acid process in production of pure phosphoric acid and supplement older method of manufacturing phosphates for fertilizer purposes.

Separation. Improvement in the "Lead Method" of Separating Phosphoric Acid in Qualitive Analysis (Eine Verbesserung der Bleimethode zur Abscheidung der Phosphorsäure bei qualitativer Analyse), D. Balarew and M. Dotschewa. Zeit. für anorganische u. allgemeine Chemie, vol. 138, no. 1, Aug. 4, 1924, pp. 79-80. Points out how authors' method for separation of phosphoric acid by means of lead nitrate can be improved upon by use of lead acetate instead of lead nitrate.

PHOTOCARTOGRAPH. See SURVEYING, Photographic.

PHOTOELASTIC ANALYSIS

Railway Motor Pinions. See ELECTRIC MOTORS, Railway.

PHOTOELASTICITY

Gear Stresses, Analysis of. The Photoelastic Method for the Determination of Causes of Failure of Metal Structures, P. Heymans, G. R. Brophy and A. L. Kimball, Jr. Am. Soc. Steel Treating—Trans., vol. 6, no. 4, Oct. 1924, pp. 505-514, 12 figs. Results obtained through scientific study of stresses set up in metal structures, resulting from design and method of installation or assembly; investigation applied specifically to study of pinion gears; as result of photoelastic method of analysis, predictions as to form of failures were made and then substantiated by actual tests with steel gears.

PHOTOELECTRICITY

Application. Photoelectric Cells and Their Application (Les piles photo-électriques et leurs applications), H. Vigneron. Nature (Paris), no. 2615, May 17, 1924, pp. 313-317, 8 figs. Explains theory of photoelectricity and its application to transmitting pictures.

Cells, High-Vacuum. Photo-Electric Cells, C. F. Elwell. Elecn., vol. 93, no. 2425, Nov. 7, 1924, pp. 520-522, 8 figs. Details and application of Case's high-vacuum type.

PHOTOGONIOMETER. See SURVEYING, Photographic.

PHOTOGRAPHY

Aerial. See AERIAL PHOTOGRAPHY.

Density Meter. A New Selenium Cell Density Meter, F. C. Toy and S. O. Rawling. Jl. Sci. Instruments, vol 1, no. 12, Sept. 1924, pp. 362-365, 3 figs. Instrument is essentially a density comparator and is calibrated by means of standard densities.

Exposure. On the Relation Between Time and Intensity in Photographic Exposure, L. A. Jones and E. Huse. Jl. Optical Soc. of Am. & Rev. Sci. Instruments, vol. 7, no. 12, Dec. 1923, pp. 1079-1113, 12 figs. Light source; lamp housings; photographic materials; developing; density measurements; etc. References; tables.

Lenses. Choice and Tests of Photographic Lenses (Choix et Essai des Objectifs photographiques), M. Lenouvel. Revue de l'Ingénieur, vol. 21, no. 9, Sept. 1924, pp. 30-34, 10 figs. Discusses focal length, opening of object-glass; aberration and distorsion, and methods of testing.

Photographic Lenses (Les objectifs photographiques), M. Berg. Revue de l'Ingenieur, vol. 21, no. 8, Aug. 1924, pp. 30-36, 4 figs. Development of photographic lenses; requirements of modern lenses; calculation.

Long-Distance Image Transmission. See TELESTEREOGRAPHY; Television.

Photographic Sensitivity. Studies in Photographic Sensitivity, S. E. Sheppard, E. P. Wightman and A. P. H. Trivelli. Franklin Inst.—Jl., vol. 198, nos. 4 and 5, Oct. and Nov., 1924, pp. 507-515 and 629-646, 5 figs. Oct.: Effect or oxidizers on sensitivity and on latent image. Nov.: Action of arsenite and oxidizing agents on sensitivity.

Plates. Properties of Photographic Plates (Sur quelques propriétés des plaques photographiques), Ch. Fabry and H. Buisson. Jl. de Physique & Radium, vol. 5, no. 4, Apr. 1924, pp. 97-104, 6 figs. New results obtained with instrument for registering densities of photographic plates during long series of researches on radiation of solar ultra-violet rays and atmospheric absorption; discusses laws of darkening of plates; photomicrographs of sections of photographic plate films showing differences in constitutions of emulsions with visible and ultra-violet radiations.

Projectile Flight. See CAMERAS, Photographing Moving Projectiles.

Radio Transmission of Photographs. The Transmission of Photographs by Radio, C. F. Jenkins. Tech. Eng. News, vol. 5, no. 3, Oct. 1924, pp. 96 and 110-111, 4 figs. Describes apparatus for sending photograph by radio and principle upon which design is based.

Stereoscopic. Stereoscopic Photography. English Mechanics, vol. 119, nos. 3071 and 3074, Feb. 1 and 22, 1924, pp. 32-33 and 76, 4 figs. Principles and field of stereoscopic vision; direct and indirect vision.

PHOTOMETERS

Brightness. See PYROMETERS, Optical.

Combined Light and Shadow. A New Photometer with Arrangement for Shadow Measurement (Ein neuer Beleuchtungsmesser mit Schattenmesseinrichtung), W. Bechstein. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 49, Dec. 6, 1924, pp. 1271-1272, 8 figs. Design and operation of combined light and shadow photometer made by firm of Fr. Schmidt & Haensch, Berlin, especially adapted for use outside of laboratory.

Definitions and Symbols. Photometric Definitions and Symbols (Définitions et symboles photométriques), A. Blondel. Revue Générale de l'Electricité, vol. 16, nos. 20 and 23, Nov. 15 and Dec. 6, 1924, pp. 771-775 and 896-905, 1 fig. Report on photometric definitions and symbols to International Commission on Lighting.

Flicker. A New Flicker Photometer for Heterochromatic Photometry, J. Guild. Jl. Sci. Instruments, vol. 1, no. 6, May 1924, pp. 182-189, 3 figs. Specially designed to fulfill conditions requisite to accuracy and precision in use of such instruments.

Micro. A Registering Micro-Photometer for

Accurate Measurements, M. Siegbahn. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. of Sci., vol. 48, no. 283, July 1924, pp. 217-224, 5 figs. Describes new registering microphotometer, very convenient in use, enabling measurements of line-distances with precision of 0.002 mm.

Objective Measurement. Photometer With Objective Measurement, D. D. Zaklinski. Electritchestvo, no. 11, 1924, pp. 545-546, 6 figs. Description of photometric device somewhat along scheme of Rosenberg where no reliance is placed on subjective impressions of person performing measurement. (In Russian.)

Photoelectric. A Convenient Photo-Electric Photometer and Densitometer, E. A. Baker. Jl. Sci. Instruments, vol. 1, no. 11, Aug. 1924, pp. 345-347, 2 figs. Describes short-period electrometer which has exceptionally long scale and gives readings proportional to ratio of two potentials; it is applied in construction of photoelectric photometer and densitometer, both instruments being independent of battery variations.

PHOTOMETRY

Candlepower Measurement. See ELECTRIC LAMPS, INCANDESCENT, Candlepower Measurement.

Elements of. Photometry as Related to Illuminating Engineering, W. F. Little. Illuminating Eng. Soc.—Trans., vol. 19, no. 6, July 1924, pp. 497-508 and (discussion) 508-517, 16 figs. Discusses elements of photometry and its application to engineering problems including illumination tests, color photometry, actinicity measurements, etc.

Heterochromous. Heterochromous Photometry (sur la photométrie hétérochrome), Ch. Fabry. Revue Générale de l'Electricité, vol. 16, no. 13, Sept. 27, 1924, pp. 533-540. Report of Committee on Heterochromous Photometry to International Commission on Lighting, discussing research work necessary, radiation of black bodies and filaments of electric lamps, new photometric apparatus, etc.

Using Absorbing Screens in Heterochromous Photometry (Sur l'emploi des écrans absorbants en photométrie hétérochrome), R. Jouaust. Revue Générale de l'Electricité, vol. 16, no. 15, Oct. 11, 1924, pp. 571-574, 2 figs. Standards for measuring light; use of color screens; comparison with monochromatic light; etc.

Surface. Photometric Measurement of Sources of Light Having a Large Area (Die Photometrierung grossflächiger Lichtquellen), R. Hiecke. Elektrotechnik u. Maschinenbau, vol. 42, no. 41, Oct. 12, 1924, pp. 307-308 (Lichttechnik), 1 fig. Discusses application of photometry where source of light ceases to be a point and uses Sahulka photometer for this calculation.

Visibility of Radiant Energy. The Visibility of Radiant Energy, K. S. Gibson and E. P. T. Tyndall. Illuminating Eng. Soc.—Trans., vol. 19, no. 2, Feb. 1924, pp. 176-193 and (discussion) 194-196, 8 figs. Describes step-by-step method used by U. S. Bur. Standards in coöperation with Nela Research Laboratories in a determination made of visibility of radiant energy, an equality-of-brightness method with little or no hue difference in two parts of photometric field, also apparatus. Energy values based upon radiometric and spectrophotometric measurements. Comparison between results of present investigation and those previously obtained by step-by-step and flicker methods. Recommended changes in I. E. S. adopted mean values.

PHOTOMICROGRAPHY. See METALS, Photomicrography of; MICROSCOPY, Telephone Apparatus, Application to.

PICRIC ACID

Specific Heat. See EXPLOSIVES, Specific Heats.

PIERS

Bell-Base Cylinder. Bell-Base Cylinder Piers for a Heavy Warehouse, R. H. Chambers. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 287-289, 4 figs. Foundation on submerged site required 114 concrete piers sunk to depths up to 85 ft.; hardpan interrupts sinking by dredging; bases belled out under compressed air for bearing.

Coal. See COAL HANDLING, Piers.

Concrete. Bremerton Navy Yard Pier Built of Precast Concrete, W. F. Way. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 436-440, 8 figs. Design avoids delays and dangers that menace concrete while setting in tidewater; beams, girder sides, and cylinders with bell ends cast in yard.

Construction of the Ballantyne Pier, Vancouver, A. L. Harvey. Can. Engr., vol. 47, no. 8, Aug. 19, 1924, pp. 249-252, 5 figs. New pier greatly improves shipping facilities at port; pier which is 1200 ft. long and 341 ft. wide is principally of concrete construction, equipped with modern cranes and complete electrical installation.

Mobile Tower Chuting Plant Builds Concrete Pier at Havana. Eng. News-Rec., vol. 93, no. 2, July 10, 1924, pp. 52-54, 4 figs. Describes concreting plant and form construction in connection with construction of a massive concrete pier deck and house on concrete piles in deep water in Havana. Stiff-leg tower, having a counterweight chute, travels on apron around pier house. Deck forms suspended from pile tops.

Special Features in Construction of New Pier, C. R. Wilson. Concrete, vol. 25, no. 1, July 1924, pp. 9-12, 5 figs. Work in connection with building of reinforced-concrete pier and headhouse for their Port of Havana Docks Co., in Havana Harbor, Cuba, adjacent to other docks. Reprinted from Turner Constructor, Apr.-May 1924.

Fire Protection. Report of the Special Committee Appointed to Consider the Report Made to the National Fire Protection Association on the Fire Hazard of Docks, Piers, and Wharves. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 272-285. Recommendations on nomenclature, fire walls and clear height; fire-resistive and non-fire-resistive piers and wharves; treatment of existing piers; fire protection.

Pneumatic Concreting of Cylinders. Foundation Cylinders Concreted by Pneumatic Method, W. F. Way. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 479-480, 3 figs. Combination concrete lock and manway inserted in top of concrete cylinder and made tight with rubber skirt.

PIG IRON. See IRON, PIG.

PIGMENTS

Litharge. See LEAD, Products, Manufacture.

Lithopone. Record of Experiments in Testing the Light-Resistance of Lithopone, H. A. Gardner and P. C. Holdt. Paint Mfrs.' Assn. of U. S. —Sci. Section, circular no. 194, Jan. 1924, pp. 174-205, 11 figs. Effect of acidity of varnish and oil.

Microchemistry. The Microchemistry of White Pigments and Inerts as They Occur Mixed in Paints, H. Green. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 677-680, 7 figs. Used in making paint analyses and in studying nature of complex pigments such as lithopone.

Oil Absorption of. The Oil Absorption of Pigments, J. H. Calbeck. Chem. & Met. Eng., vol. 31, no. 10, Sept. 8, 1924, pp. 377-382, 12 figs. A study based upon recent investigations of wetting

properties of paint and varnish vehicles and upon volume relationship between vehicle and pigment. Bibliography.

Prussian Blue. See COAL GAS, Prussian Blue from.

Red Lead. See LEAD, Products, Manufacture.

Titanium White. Production and Properties of Titanium White (La fabbricazione e le proprieta bei bianchi di titanio), E. Livraghi. Industria, vol. 38, no. 15, Aug. 15, 1924, pp. 424-426. Discusses process of manufacture in Norway, by treating finely powdered ilmenite with concentrated H_2SO_4; its use and properties as pigment.

White Lead. New View of the Old Dutch White Lead Process, Fred. W. Shaw. Chem. & Met. Eng., vol. 30, no. 2, Jan. 14, 1924, pp. 51-53, 8 figs. Account of experiments that seem to upset accepted theory of fermentation of tan bark in stacks.

See also LEAD, Products, Manufacture.

PILE DRIVERS. See CRANES, Combination Pile Driver and Crane.

PILES

Combination Wood and Reinforced-Concrete. Wood and Reinforced Concrete Combination Pile, H. J. Harms. Concrete, vol. 25, no. 5, Nov. 1924, pp. 172-174 and 179-180, 17 figs. Describes Handle pile, invented by Egi Handl, Dutch engineer, which has been used to a great extent in Holland, solving their foundation problem for ordinary houses.

Concrete. Concrete Piles and Concrete Piling Construction, M. M. Upson. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 3, Apr. 1924, pp. 103-128 and (discussion) 128-142, 22 figs. Résumé of concrete pile industry and development in United States during last 20 years.

Pile Casting Methods for Concrete Pier at Havana, J. S. Vedoe. Eng. News-Rec., vol. 93, no. 20, Nov. 13, 1924, pp. 785-788, 5 figs. Plan and equipment of casting yards; form construction and molding processes; fabricating reinforcement; repairing casting defects and fractures.

See also CONCRETE CONSTRUCTION, REINFORCED, Gas Works; WHARVES, Wing-Pile Construction System.

Driving. Formulas Used in Pile Driving (Notas sobre algunas fórmulas empleadas en la hinca de pilotes), J. Botin. Ingeniería y Construcción, vol. 2, no. 23, Nov. 1924, pp. 500-504, 5 figs. Discusses Dutch and Benaveng formulas for calculating permissible load, and gives some examples in pile driving.

Marine Borers, Destruction by. Marine Piling Investigations of the National Research Council, W. F. Clapp. Boston Soc. Civil Engrs.—Jl., vol. 11, no. 9, Nov. 1924, pp. 417-425 and (discussion) 426-442, 5 figs. Review of work accomplished in last few years in study of shipworm and some of the methods which have been used in preventing or alleviating destruction.

See also MARINE BORERS, Protection Against.

Set Recorder. The Ackermann Autographic Apparatus for Measuring and Recording the Movements of a Pile While Subject to the Blow of a Hammer, A. S. E. Ackermann. Jl. of Sci. Instruments, vol. 1, no. 4, Jan. 1924, pp. 123-124, 2 figs. Describes apparatus which is more particularly for use in connection with marine and river piles where a fixed point from which to measure set is difficult to obtain.

Sheet, Concrete. Concrete Piles Resist Action of Sea Water for Five Years, Chas. M. Spofford. Eng. News-Rec., vol. 92, no. 18, May 1, 1924, p. 765. Precast sheet piling apparently in good condition in bulkheads at Boston Army Supply Base; special care used to obtain dense concrete.

Novel Sheet Pile Construction at New Orleans, L. M. Arms. Ry. Age, vol. 76, no. 21, Apr. 26, 1924, pp. 1023-1025, 5 figs. Illinois Central uses Bignell yet type in building levee wall at Stuyvesant dock.

Supporting Power and Pulling Resistance. The Ultimate Supporting Power and Pulling Resistance of Piles Placed Hydraulically, R. P. V. Marquardsen. Eng. & Contracting (Buildings), vol. 61, no. 4, Apr. 23, 1924, pp. 885-893, 5 figs. Discussion of vertical and horizontal supporting power of piles, vertical and inclined pulling resistance of piles, and miscellaneous problems.

PIPE

Blast-Furnace-Slag. A New Process for the Manufacture of Pipes from Blast-Furnace Slag (Ein neues Verfahren zur Herstellung von Rohren aus Hochofenschlacke), Fr. Riedel. Stahl u. Eisen, vol. 44, no. 39, Sept. 25, 1924, pp. 1173-1174. See also (translation) Iron & Coal Trades Rev., vol. 109, no. 2961, Nov. 28, 1924, p. 870. Describes production of pipes from blast-furnace slag without addition of cement; tests of strength; advantages of process.

Cast-Iron. See PIPE, CAST-IRON.

Centrifugally Cast. See PIPE, CAST-IRON, Centrifugally Cast.

Concrete. See PIPE, CONCRETE.

Connections. Various Methods of Making Pipe Connections, R. W. Angus. Can. Engr., vol. 46, no. 14, Apr. 1, 1924, pp. 381-382, 5 figs. Details in construction and operation of water works plants which are not always given sufficient consideration; connection of service pipes to water main; waste pipe design; reservoir connections and drain pipes.

Corrosion. Corrosion of Underground Pipe Lines, K. H. Logan. Chem. & Met. Eng., vol. 31, no. 26, Dec. 29, 1924, pp. 1011-1012. First progress report of extended investigation indicates that soil conditions are more important factor than pipe materials. (Abstract.) Paper presented before Am. Foundrymen's Assn. and published by permission of Bur. of Standards.

Remedies for Subaqueous Corrosion of Pipe, C. W. Foulk. Fire & Water Eng., vol. 76, no. 6, Aug. 6, 1924, pp. 259-260 and 277. Discusses phenomena of corrosion; effect of dissolved oxygen on iron; protective coating deposited by water; formation of acid water. Abstract of paper read before Ohio conference on Water Purification at Columbus, Ohio.

Coverings. See PIPE COVERINGS.

Flanges, British Standard. British Standard Flanges, M. H. Sabine. Machy. (Lond.), vol. 25, no. 639, Dec. 25, 1924, pp. 410-411, 2 figs., 2 tables. Presents tables prepared to show what saving in space can be gained by clipping of flanges for equal and unequal combinations.

Intersections, Volumes and Areas of. Formulas for Volumes and Areas of Pipe Intersections, G. Paaswell. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 28-29, 3 figs. Data covering determination of volumes of cylinder intersections such as those at junction of arches or in special pipe castings.

Laying. See PIPE LAYING.

Lead-Lined. Making Lead-Lined Pipe. Chem. & Met. Eng., vol. 30, no. 9, Mar. 1, 1924, pp. 351-353, 5 figs. How piping and valves are produced so that they possess both chemical resistivity of lead and strength of iron.

Small, Heat Transfer in. See HEAT TRANSMISSION, Pipes.

Steam. See STEAM PIPES.

Steel. See PIPE, STEEL.

Strength and Stiffness Determination. Charts for Bars and Pipe in Torsion, F. Szabo. Am. Mach., vol. 60, no. 8, Feb. 21, 1924, pp. 279-282, 2 figs. Two charts making possible rapid solution of problems dealing with round bars and pipe in torsion; for determining strength and stiffness or angle of twist.

Stresses in. Stresses in Thin Circular Pipes, etc., Under Symmetrical Loads, G. P. Manning. Concrete & Constructional Eng., vol. 19, nos. 7 and 8, July and Aug. 1924, pp. 437-442 and 491-495, 6 figs. Develops formulas and makes calculations.

Water. See WATER PIPES.

Welding. Helping the Pipe Welder, C. R. Price. Welding Engr., vol. 9, nos. 11 and 12, Nov. and Dec. 1924, pp. 34, 36 and 38; and 34, 36, and 38, 20 figs. Experience obtained in welding of pipe in oil refineries, which may be found applicable in other fields where considerable pipe welding is done. Devices used which greatly reduce labor; clamps and rollers; methods of welding flanges to pipe.

Wood-Stave. See PIPE, WOOD-STAVE.

Wrought-Iron. See PIPE, WROUGHT-IRON.

PIPE, CAST-IRON.

[See also WATER PIPE, Cast-Iron.]

Census of Manufactures. Cast-Iron Pipe. U. S. Bur. Census, 1923, 7 pp. Census of manufactures, covering operations of manufacturing establishments during 1921.

Centrifugally Cast. Centrifugal Cast Pipe. Iron Age, vol. 114, no. 26, Dec. 25, 1924, p. 1674. New process for iron to eliminate chilling and annealing; known as Henry-Weitling-Peake process; involves employment of liquid mercury and mercury vapor.

Centrifugal Metal Mould Cast Iron Pipes. Metal Industry (Lond.), vol. 25, no. 25, Dec. 19, 1924, p. 598. Discussion on spun cast iron pipes at meeting of Lancashire Branch of Instn. Brit. Foundrymen. Advantages of process; rate of output; comparison with ordinary sand-cast pipe; resistance to corrosion; comparative costs.

Centrifugal Pipe by a New Process. Iron Age, vol. 113, no. 23, June 5, 1924, p. 1660. "Sand-spun" iron from sand mold with refractory lining; developed by group of American foundrymen.

Manufacture of Cast-Iron Pipe in the South, R. Moldenke. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1365-S, Sept. 1924, 5 pp. Discusses some economic conditions which have made career of cast-iron pipe industry in United States a checkered one. Describes the two new developments in manufacture of cast-iron pipe, both along lines of centrifugal casting, and presents advantages and disadvantages of both processes. Statistics on production of pipe in United States at present time, as well as on Southern plants and their capacities.

Modern Methods of Pipe Manufacture by the Centrifugal Process, E. J. Fox and P. H. Wilson. Foundry Trade Jl., vol. 30, no. 417, Aug. 14, 1924, pp. 131-139, 15 figs. See also Iron & Coal Trades Rev., vol. 109, no. 2948, Aug. 29, 1924, pp. 344-346, 8 figs. Describes methods at works of Stanton Ironworks Co., Ltd., Stanton, operating on de Lavaud process.

Concrete Lined. Concrete-Lined Pipes Resist Acidulous Mine Water, C. H. S. Tupholme. Coal Age, vol. 26, no. 16, Oct. 16, 1924, pp. 548-549. Centrifugal method for making both iron and concrete pipes, introduced into England by Stanton Ironworks Co.

Modern Cement Lined Service Pipe, R. J. Newsom. Can. Engr., vol. 47, no. 9, Aug. 26, 1924, pp. 283-284. Cast Iron pipe lined with modified portland cement mixture has proved satisfactory for water services; fittings lined with lead or tin. Abstract of paper read before Am. Water Works Assn.

Prolonging the Life of Pipe by Cement Lining, R. J. Newsom. Fire & Water Eng., vol. 76, no. 6, Aug. 6, 1924, pp. 255-256 and 280-281. How this type of lining lengthens age of pipe and increases delivery of water; fallacy of oversizing; lining of large pipe. Abstract of paper read before Am. Water Works Assn.

Foundries. See FOUNDRIES, Soil-Pipe.

Gas Mains. See GAS MAINS.

Welding. An Improved Process of Jointing Cast Iron Pipe. Can. Mfr., vol. 44, no. 12, Dec. 1924, pp. 19-20, 3 figs. Method of welding cast iron pipe with Tobin bronze which has been found to be satisfactory and is at present recommended as process to be used.

PIPE, CONCRETE

Centrifugally Cast. Centrifugal Cement Pipes (Schleuderzementrohre), Tonindustrie - Zeitung, vol. 48, no. 52, June 28, 1924, pp. 567-568, 4 figs. Details of pipes constructed according to German patent 387745 at works of Berger Maschinenfabrik.

The Manufacture of Plain and Reinforced Cement Pipe by the Centrifugal Method (La fabrication des tuyaux en ciment armé et non armé par l'action de la force centrifuge), Y. Letort. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 123, no. 2, Feb. 1924, pp. 117-145, 21 figs. Describes different processes for manufacture of both reinforced and non-reinforced cement pipe by centrifugation, with special reference to STAC process.

Coignet-Ravier System. See WHARVES, Wing-Pile Construction System.

Manufacture. The Manufacture of Pipe for Spavinaw Water Project. Eng. News-Rec., vol. 92, no. 21, May 22, 1924, pp. 899-902, 8 figs. 53 mi. of reinforced-concrete pipe made in field factory in 13½ months; operation rate at 97 per cent capacity was 1.3 mi. per week.

Pressure. Reinforced-Concrete Pipe for Pressure Lines (Tuyaux en béton armé pour conduites forcées), E. Monteux. Génie Civil, vol. 85, no. 17, Oct. 25, 1924, pp. 374-377, 11 figs. Requirements of reinforced-concrete pipe capable of replacing steel pipe. Makes calculations.

Reinforced-Concrete Pipes for Water Under Pressure (Les tuyaux en ciment armé pour conduites d'eau sous pression), M. Bousquet. Nature (Paris), no. 2623, July 12, 1924, pp. 21-24, 6 figs. Details of manufacture by centrifying process by Zublin & Co. at Strassburg; reinforcing, jointing, etc.

Sewer. See SEWERS, Concrete.

Spun. The Modulus of Elasticity of "Spun" Concrete in Tension. Concrete & Constr. Eng., vol. 19, no. 11, Nov. 1924, pp. 709-714, 3 figs. Report of investigation on spun concrete pipes; results of transverse, compression, and tension tests.

Water-Supply. Pre-Moulded Reinforced Concrete Pipe, W. G. Chace. Can. Engr., vol. 46, no. 15, Apr. 8, 1924, pp. 416-417, 3 figs. Design of pipe which has recently been offered for water works intake lines and which has received very favorable comment, including its acceptance for use of two New England cities. From paper read before Can. Sec., Am. Water Wks. Assn.

PIPE COVERINGS

Specifications. Specifications for Pipe Coverings, H. E. Collins. Mgmt. & Administration, vol.

8, no. 5, Nov. 1924, pp. 503-506, 1 fig. Rules for specifying quality and size of insulation.

Steam-Pipe, Radiation Losses. Eng. & Boiler House Rev., vol. 37, no. 8, Mar. 1924, pp. 286-287, 2 figs. Saving to be effected by suitable and efficient steam-pipe covering.

See also STEAM PIPES, Coverings, Heat Loss Through.

Tests. Commercial Efficiency of Single and Graded Steam Pipe Coverings. Heat. & Vent. Mag., vol. 21, no. 1, Jan. 1924, pp. 48-52, 6 figs. Results of recent tests on magnesia, air cell, asbestocel, carocel, nonpareil, sponge felt and multiply types, conducted at State College of Wash. and reported in Eng. Bul. no. 12 by H. J. Dana.

PIPE LAYING

Water Mains. Laying Large Water Main Through Swamps in New Orleans, J. T. Eastwood. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, pp. 854-856, 6 figs. Mules haul pipe on 8-wheel wagons; clamshell lifts wedge of roots cut by steel sheeting; piles hold bends; tapping machine brought to job for special connection.

PIPE LINES

Bridges. Pipe Lines on Bridges, P. L. Brockway. Public Works, vol. 55, no. 8, Aug. 1924, pp. 239-241, 3 figs. Details in designs of arch and concrete girder bridges to provide for carrying pipe lines and other public utility conduits.

Friction of. Pipe Friction. Mech. Wld., vol. 76, no. 1958, July 11, 1924, pp. 21-22, 2 figs. Discusses available formulas for calculating frictional resistance in pipe lines for water, applicable mainly to power-plant work.

Oil. About Oil Pipe Lines, V. G. Shookhoff. Petroleum & Oil-Shale Industry (Russian), vol. 6, no. 2, 1924, pp. 308-313. Author deals with transportation cost of oil in pipe lines, basing his considerations not only on work of few existing Russian pipe lines, but also on American practice. Considers construction of pipe lines, their design, construction cost and exploitation, and calculates cost of transportation from these data. (In Russian.)

The Design of Oil Fuel Pipe Lines, W. G. Watkins. Engineering, vol. 118, nos. 3076, 3077, and 3078, Dec. 12, 19, and 26, 1924, pp. 792-793, 823-825, and 853-854, 15 figs. Factors on which design depends; temperature is said to be keynote of problem; presents charts to facilitate calculation; examples.

Water Hammer in. See WATER HAMMER.

Welding. Pipe Line Welding, N. E. Wagner. Acetylene Jl., vol. 25, no. 6, Dec., 1923, pp. 276-280 and 284-285, 8 figs. Review of progress made in this field during 1923.

Report on Welding of Pipe, G. O. Carter. Am. Welding Soc.—Jl., vol. 3, no. 7, July 1924, pp. 13-19. Discusses welding applied to very extensive pipe lines, large and small plants and installations, including long oil and gas pipe, etc., organization of welding crews, cost of welding, etc.

Wood-Stave, Reconditioning of. Reconditioning Wood Stave Pipe Line, J. B. Holdcroft. Can. Engr., vol. 46, no. 17, Apr. 22, 1924, pp. 447-449, 4 figs. How repairs were made to sections of a 72-in. continuous pipe line at Anyox, B. C., which had deteriorated owing to severe operating conditions. Suggestions for preserving wood pipe and care of bands and shoes.

PIPE, STEEL

Bending. Pipe Bending, Johnstone-Taylor. Boiler Maker, vol. 24, no. 3, Mar. 1924, p. 81, 1 fig. Brief review of Bonn system developed in England and scope of its application.

Corrosion. See STEEL, Corrosion.

Failure. High-Head Penstock Failure Found Due to Bad Steel. Power, vol. 59, no. 10, Mar. 4, 1924, pp. 373-374, 1 fig. Section of 30-in. pipe for 1909-ft. head ruptures through laminated end of plate; welds not affected.

Gas Mains. See GAS MAINS, Welded Steel.

Manufacture and Laying. The Pipe Lines for the Tansa Completion Works. Engineer, vol. 137, no. 3560, Mar. 21, 1924, pp. 302-303. Manufacture and laying of steel pipes required in scheme for additional supply of water to be conveyed to City of Bombay.

Threading. Pipe Threading in Oil Field Service, F. D. Bostaph. Oil Trade Jl., vol. 15, no. 7, July 1924, pp. 40-44. Investigation shows that greater percentage of trouble develops when long threaded pieces and couplings are being screwed together in field than when shorter couplings and threads were used. Concludes that threading chasers as in use in all threading machines at present time do not reproduce pitch of their own threads on pipe in all cases.

PIPE, WOOD-STAVE

Construction. Wood Stave Pipe for Pueblo's Water Supply Line, W. A. Scott. Eng. Wld., vol. 25, no. 2, Aug. 1924, p. 61, 1 fig. Federal Pipe & Tank Co., Seattle, completed installation of 21,800 lin. ft. of continuous-stave wood pipe as water-supply line; pipe was made of Douglas fir staves which were creosote treated by vacuum and pressure process.

Wood Stave Pipe Lines and Penstocks, J. B. Holdcroft. Can. Engr., vol. 47, no. 3, July 15, 1924, pp. 149-151, 5 figs. Consideration involved in design of wood-stave pipe employed for hydraulic power installations; Douglas fir used in manufacture; settling dimensions of staves; design of tongues, bands, and cradles.

Design. Wood-Stave Penstocks (Holzdaubenrohre), H. Rabovsky. Elektrischer Betrieb, vol. 22, no. 2, Jan. 24, 1924, pp. 9-10, 3 figs. Points out that steel penstock may frequently be replaced by much cheaper wood-stave pipe line; up to diameter of 600 mm. ready-made wooden pipes of 3 to 6 m. length can be obtained and shipped from factories; penstocks of larger diameter are assembled in place from specially shaped wooden pieces; as a rule these pipes are for hydraulic pressures not exceeding 15 atmos; internal friction of pipes decreases with time, as their inside surface becomes covered with slimy sediment.

Maintenance. Maintenance of Wood-Stave Pipe in Hydro-Electric Practice, B. E. White. Power, vol. 60, nos. 21 and 26, Nov. 18 and Dec. 23, 1924, pp. 794-796 and 1019-1020, 4 figs. Information of methods of installation and maintenance, including description of number of cases where troubles with wood-stave pipe have developed in and near New York State; means taken to safeguard pipe and lengthen its life; suitable methods of installing and maintaining such pipe so as to obtain longest life. Dec. 23: Failures due to improper backfill.

PIPE, WROUGHT IRON

Hammer-Welded. Making Large Size Hammer-Welded Pipe, Geo. F. Tegan. Iron Age, vol. 114, no. 20, Nov. 13, 1924, pp. 1263-1268, 11 figs. Practice of Nat. Tube Co., McKeesport, Pa., in manufacture of penstocks, tanks, stills, digesters and receivers; methods of forming and welding; finishing to size.

Manufacture. The Manufacture of Wrought Iron Pipe. Universal Engr., vol. 40, no. 4, Oct. 1924, pp. 34-40, 16 figs. Chemical and physical characteristics.

PIPING

Compressed-Air, Calculation of. Application of Nomography to Calculation of Compressed-Air Con-

duits (Application de la nomographie au calcul des conduites d'air comprimé), J. Ponset. Arts et Métiers, vol. 77, no. 45, June 1924, pp. 204-219, 2 figs. Formulas available; construction of graphic charts and their application; examples.

Power Plants. Maintenance of Piping Systems, A. K. Vradenburgh. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 940-941. Familiarity with piping layout is of first importance when taking charge of a plant.

PISTON RINGS

Casting. See CASTING, Centrifugal.

Design. The Design of Piston Rings. Machy. (Lond.), vol. 25, nos. 632 and 635, Nov. 6 and 27, 1924, pp. 171-173 and 273-274, 5 figs. Nov. 6: Remarks and data applying to Ramsbottom type of ring; formula for radial pressure; normal stress on cross section of ring. Nov. 27: Design of concentric ring.

Groove Finishing. Methods of Finishing Piston Ring Grooves. Automotive Mfr., vol. 66, no. 3, June 1924, pp. 15 and 26. Current practice of leading American firms; ordinary formed cutters leave tool marks and result in gas leakage.

Machining. Machining Piston Rings on a Production Basis, H. P. Armson. Can. Machy., vol. 31, no. 4, Jan. 24, 1924, pp. 13-16, 3 figs. Comparison of casting methods with a description of process employed by a Toronto plant in manufacturing rings for automotive industry.

Making Satisfactory Piston Rings, J. McIntosh. Am. Mach., vol. 61, no. 24, Dec. 11, 1924, pp. 917-918, 2 figs. Correct mixture of iron and careful pouring and cooling are said to be necessary for best results; grinding oversize with provision for closing.

Piston-rings and their Production, J. McIntosh. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 93-94, 1 fig. Methods of machining, finishing, testing, facing sides, and grinding outside diameter.

Pearlitic Cast-Iron. See CAST IRON, Pearlitic.

Self-Tightening. A New Method of Calculation and Production of Self-Tightening Piston Rings (Ein neues Verfahren zur Berechnung und Anfertigung selbstspannender Kolbenringe), O. Pollert. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 11, Mar. 15, 1924, pp. 253-254, 2 figs. Special process devised by Swedish engineer, R. Bennet, based on principle that ring should be turned to such form, before being cut, that it becomes exactly circular when closed; author considers problem mathematically and from standpoint of practical realization of correct curve; measurements made in cylinders using ordinary and Bennet rings show marked superiority of latter as regards uniformity of cylinder wear.

PISTONS

Accurate, Securing. Maxwell Method of Securing Accurate Pistons, F. H. Colvin. Am. Mach., vol. 60, no. 24, June 12, 1924, pp. 873-874, 4 figs. Novel chuck by which piston is squared with piston-pin hole before final turning; gages used in measuring checking and grading.

Aluminum-Alloy, Casting. Casting Aluminum Alloy Pistons in Metal Moulds, R. J. Anderson and M. E. Boyd. Metal Industry (Lond.), vol. 25, nos. 21 and 22, Nov. 21 and 28, 1924, pp. 494-496 and 517-518, 17 figs. Results of investigations into effect of different gating methods, feeders, risers, etc., and effect of variations in pouring and mold temperatures. (Abstract.) Paper read before Am. Foundrymen's Assn.

Automatic Piston Machine. Automatic Piston Machine. Iron Age, vol. 113, no. 20, May 15, 1924, pp. 1432-1433, 7 figs. New 6-spindle, 10-in. Contin-U-Matic machine, with which automobile pistons are machined at rate of three per min. with three simultaneous operations.

Automobile-Engine. Pistons of Light Metal for Fuel-Oil Engines for Automotive Purposes (Leichtmetall- und Leichtstoffkolben unter Berücksichtigung der Hochdruck-Schweröl-Fahrzeugmotoren), F. E. Bielefeld. Wirtschaftsmotor, vol. 6, no. 6, June 25, 1924, pp. 1-7, 28 figs. Light weight and high thermal conditions of such pistons are valuable features. Describes number of designs.

See also AUTOMOBILE ENGINES, Machining parts.

Inwardly Sprung Rings. The Design of Piston Rods and Pistons with Inwardly Sprung Piston Rings (Gestaltung der Kolbenstangen und Kolben mit nach innen federnden Kolbenringen), O. Graf. Maschinenbau, vol. 3, no. 15, May 8, 1924, pp. 520-522, 7 figs. Characteristics of inwardly sprung piston rings; examples of application to piston rods and pistons; stress curve; stress and diameter measuring instrument; universal piston-ring diameter; measuring clock.

Machining. Machining Pistons and Other Contract Work, H. P. Armson. Can. Machy., vol. 31, no. 3, Jan. 17, 1924, pp. 17-20, 3 figs. Describes method of Allatt Machine & Tool Co., Toronto, of machining cast-iron automotive engine pistons accurately and economically; salvaging worn cams by recutting race-ways for larger rollers.

Metals for. Use of Light and Ultra-Light Metals for Pistons of Explosion Engines (Au sujet de l'emploi des alliages légers et ultra-légers pour les pistons de moteurs à explosion), M. de Fleury. Académie des Sciences—Comptes rendus des séances, vol. 178, no. 26, June 23, 1924, pp. 2161-2164. See also Génie Civil, vol. 85, no. 3, July 19, 1924, pp. 71-72. Discusses advantages of light metal from standpoint of cooling and of lightness of piston.

Pins. Some Notes on Carburized Piston Pins, R. S. Archer. Am. Soc. Steel Treating—Trans., vol. 6, no. 5, Nov. 1924, pp. 615-618. Discusses manufacture and heat treatment of piston pins used in Liberty aircraft engines which were produced in large quantities during World War; types of steels used, their heat treatment and methods of testing.

PITCH

Coal-Tar. See WATERPROOFING, Coal-Tar Pitch for.

Coal-Tar, Roofing. See ROOFS, Coal-Tar Pitch for.

PITOT TUBES

Calibrating. See FLOW OF WATER, Measurement.

PLANERS

Development. Possibilities of Developing Planing Machines (Entwicklungsmöglichkeiten der Hobelmaschine), O. Forkel. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 641-644, 5 figs. Discusses increase in speed of operation, reversing, etc.

Equipment for. Tooling Reciprocating Machine Tools. Eng. Production, vol. 7, no. 139, Apr. 1924, pp. 94-97, 10 figs. Tools and special equipment for planers.

High-Speed. A Large High-speed Planing Machine. Engineer, vol. 138, no. 3586, Sept. 19, 1924, pp. 321-322, 1 fig. Brief description of unusually large high-speed planing machine, made by Thomas Shanks & Co., Ltd., Johnstone, Scotland, for one of the largest marine engineering and shipbuilding firms. Especially intended for dealing with heavy Diesel engine work. Distance between uprights 16 ft. 9 in.; height above table and under cross slide at its highest 12 ft. 4 in.

New Type. Planer with New Features. Iron Age, vol. 114, no. 26, Dec. 25, 1924, pp. 1677-1678, 3 figs. Cross rail carries own motor for rapid traverse of rail and heads in new planer brought out by Liberty Machine Tool Co., Hamilton, Ohio; control is centralized.

PLANETARIUM. See GEARS, Planetarium.

PLANIMETERS

Polar. The Constants of the Polar Planimeter (Die Konstanten des Polarplanimeters), A. Haerpfer. Zeit. für Instrumentenkunde, vol. 44, no. 6, June 1924, pp. 270-274. Mathematical investigation of two principal constants of instrument which are connected with its mechanical adjustments; theoretical results are supported by appropriate numerical data; this study was necessary for very accurate work.

PLANING

Sine-Bar Gage for. See GAGES, Sine-Bar.

PLASTER

Gypsum. Getting Rid of Efflorescence on Gypsum Plaster, F. C. Welch. Chem. & Met. Eng., vol. 31, no. 7, Aug. 18, 1924, pp. 263-264. Study of causes of surface spotting of plaster by soluble salts and suggestions for eliminating it.

PLASTICITY. See ELASTICITY, Plasticity and.

PLATES

Annular. The Elastic Stability of an Annular Plate, W. R. Dean. Roy. Soc.—Proc., vol. 106, no. A-737, Sept. 1, 1924, pp. 268-284, 3 figs. Deals with elastic stability of a circular annular plate under uniform shearing forces applied at its edges.

Circular, Stresses in. Contribution to the Theory of Stresses Occurring in Circular and Ring-Shaped Plane Disks Subjected to Unevenly Distributed Pressure (Bidrag till hållfasthetsteorien för den cirkulära och ringformiga plana skivan belastad med ett jämnt fördelat tryck), A. F. F. Peterson. Teknisk Tidskrift, vol. 53, nos. 39, 40, 41, and 42, Sept. 29, Oct. 6, 13, and 20, 1923, pp. 306-308, 315-316, 321-322, and 329-331 (Allmänna Avdelningen), 17 figs. Develops theories for different methods of support of disk.

Drilled, Stresses in. Effect Net Section of Drilled Plates, C. R. Young and W. B. Dunbar. Can. Engr., vol. 47, no. 24, Dec. 9, 1924, pp. 575-580, 10 figs. Tests show zig-zag section always weaker than right section of same area; usual hypothesis respecting stress variation on diagonal section incorrect; new and less severe deduction diagrams; approximate rule.

Elastic Deformation. Elastic Deformation of a Uniformly Loaded Contour-Supported Thick Plate (Plaques rectangulaires épaisses), C. A. Garabedian. Acad. des Sciences—Comptes Rendus, vol. 178, no. 7, Feb. 11, 1924, pp. 619-622. Author indicates his method of investigation by employment of series, as previously applied by him to investigation of circular plates; also gives complete solution for displacements. Note by Mesnager calls attention to interest and importance of work.

Flanging Tests. Tests on the Flanging of Thin Plates (Essai d'emboutissage sur tôles minces), M. Guillery. Revue de Métallurgie, vol. 21, no. 5, May 1924, pp. 303-311, 17 figs. Describes two machines for testing thin plate in order to determine their resistance to cold flanging; method of testing, and results of tests.

Flattening Machine. Hydraulic Plate Flattening Machine. Machy. (Lond.), vol. 23, no. 600, Mar. 27, 1924, pp. 838-839, 4 figs. Type which operates on principle of gripping plate at each end and pulling it taut until irregularities and buckles disappear.

Perforated, Stresses in. On Stresses in a Plate with a Circular Hole, S. Timoshenko. Franklin Inst.—Jl., vol. 197, no. 4, Apr. 1924, pp. 505-516, 6 figs. Method of approximating influence of beads, used to reinforce holes, on local stresses.

Rectangular, Deflection of. Deflection of a Rectangular Plate of Different Stiffness Against Bending in Longitudinal and in Transverse Direction, the Edges Being Supported but not Clamped In (Über die Biegung einer rechteckigen Platte von ungleicher Biegungssteifigkeit in der Längs- und Querrichtung bei einspannungsfreier. Stützung des Randes), M. T. Huber. Bauingenieur, vol. 5, nos. 9 and 10, May 15 and 31, 1924, pp. 259-263 and 305-311, 8 figs. Exact solution of problem in case of sinusoidal distribution of load and approximate solution in case of uniform load. Exact general solution by means of double infinite series. Consideration of concrete slabs with transverse reinforcement.

PLATINUM

Canada. Platinum Situation in Canada. Can. Min. Jl., vol. 45, no. 39, Sept. 26, 1924, pp. 953-954. Résumé of conditions.

Production, 1923. Platinum and Allied Metals in 1923. U. S. Geol. Survey, no. I:2, Aug. 9, 1924, pp. 9-22. Production, imports and exports, consumption and stock; world's production; proposed statutory definition of platinum; metallurgy; foreign deposits.

PLATINUM ALLOYS

Iridium in, Determination of. Investigations on the Platinum Metals—Determination of Iridium in Platinum Alloys by the Method of Fusion With Lead, R. Gilchrist. U. S. Bur. Standards—Scientific Papers, no. 483, Feb. 28, 1924, pp. 325-345. Details of study made of analytical details of Deville and Stas method for determination of iridium in platinum alloys containing from 0.1 to 20 per cent of iridium, and results obtained.

PLOWING

Improved Methods. See AGRICULTURE, Farm Equipment, Research in.

PLOWS

Anti-Balance Cable. Four-Furrow Anti-Balance Cable Plough; Empire Exhibition. Engineering, vol. 118, no. 3067, Oct. 10, 1924, p. 516, 1 fig. Plow is arranged to cut four furrows 14 in. wide and from 8 to 12 in. deep.

Electric. The Manless Plow, J. B. Davidson. Agricultural Eng., vol. 5, no. 8, Aug. 1924, pp. 174-175, 3 figs. Manless plow designed and built by D. B. Lucas consists of two-wheel tractor, with four-horsepower, single-cylinder engine to furnish power. Equipment built by E. D. Gordon consists of skid carrying electric motor and reels for main cable used in drawing implement back and forth across field, anchor skid upon opposite side of field carrying pulley, and reels on motor skid for moving power skid and anchor skid forward at proper time reversing mechanism.

PLUMBING

Tests. Tests on the Hydraulics and Pneumatics of House Plumbing, H. E. Babbitt. Univ. of Ill.—Bul., vol. 21, bul. no. 143, July 21, 1924, 78 pp., 31 figs. Details of tests undertaken with a view of obtaining definite information concerning positive and negative pressures found in soil-stacks, waste pipes, traps, and vent pipes, and also concerning limitations of rates of discharge and capacities of waste pipes and soil-stacks, which involved consideration of hydraulics and pneumatics of different parts of plumbing systems. Bibliography.

PLYMAX. See MATERIALS, Plymax.

PLYWOOD. See AIRCRAFT CONSTRUCTION MATERIALS, Plywood.

PNEUMATIC MACHINERY

Plate-Tightening Machine. A Pneumatic Plate Tightening Machine. Engineer, vol. 138, no. 3598, Dec. 12, 1924, p. 667, 3 figs. New type of pneumatic tool designed to automatically draw together metal sheets or plates prior to operation of riveting them together; known as Hollett pneumatic plate-tightening machine.

PNEUMATIC MAIL TUBES. See COMPRESSED AIR, Pneumatic Mail Tubes.

PNEUMATIC TOOLS

[See also COMPRESSED AIR, Improvement.]

Coal Cutters. See COAL MINING, Pneumatic Tools.

Repair and Upkeep. Repair and Upkeep of Pneumatic Tools, R. W. Wilson. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1924, pp. 151-163 and (discussion) 163-207, 19 figs. See also Engineering, vol. 117, no. 3033, Feb. 15, 1924, pp. 219-220, 7 figs. Consideration of what is necessary to maintain in efficient operation and in economical service pneumatic tools commonly used in engineering workshops and shipbuilding yards; these are roughly classified as reciprocating tools or pneumatic hammers, and rotating tools or pneumatic drills.

Waste Elimination. Cutting Out Waste in the Factory Air System, F. Johnston-Taylor. Indus. Mgmt. (Lond.), vol. 11, no. 9, May 1, 1924, pp. 239-240 and 242, 4 figs. Explains how wastage and leakage may be detected in connection with pneumatic installations in factory, and how by use of compressed-air meter, economies may be effected.

POISONING

Carbon-Monoxide. See CARBON MONOXIDE, Poisoning.

Lead. Examination of Workers at the Jena Printing Plants for Lead Poisoning (Untersuchungen der Arbeiter in den Jenaer Druckereibetrieben auf Bleikrankheit), E. Boening. Gesundheits-Ingenieur, vol. 41, no. 47, Oct. 11, 1924, pp. 477-480. Detailed examination shows that danger to workers is not nearly as great as was formerly supposed; advocates examination on larger scale to obtain more reliable statistics. Bibliography.

POLES

Concrete. See POLES, CONCRETE.

Foundations. Calculation of Pole Foundations (Berechnung von Mastfundamenten), O. Stötzner. Elektrotechnische Zeit., vol. 45, no. 49, Dec. 4, 1924, pp. 1346-1348, 5 figs. Calculations for pole foundations for German Post Office by Möller method.

Joint Use by Utilities. Joint Use of Poles by Utilities, A. D. Knowlton. Elec. Wld., vol. 84, no. 23, Dec. 6, 1924, pp. 1203-1206, 4 figs. Connecticut experience has proved advantageous to both those concerned with power circuits and with communication; how satisfactory contractual relations have developed in past few years.

Setting Equipment. Pole Setting by F. W. D. Lorry. Motor Transport (Lond.), vol. 38, no. 995, Mar. 24, 1924, pp. 359-360, 5 figs. Description of vehicle constructed by Four-Wheel Drive Auto Co., of Clintonville, Wis., for setting telegraph poles or standards for carrying overhead electric power lines and other work entailing digging of deep holes in ground.

Sizes, Determination of. Determination of Pole Sizes, J. H. Mathews. Elec. World, vol. 83, no. 23, June 7, 1924, pp. 1173-1176, 1 fig. Table permitting quick calculation of pole size for almost any type of line and facilitating calculation of type of line that can be carried on selected poles; based on Nat. Elec. Safety Code.

Steel. See POLES, STEEL.

Wooden. See POLES, WOODEN.

POLES, CONCRETE

Cast. Making and Erecting Concrete Poles, L. R. Brown. Elec. Ry. Jl., vol. 64, no. 5, Aug. 2, 1924, pp. 159-161, 6 figs. Casting is done in horizontal steel forms with reinforcing rods wired to cast-iron rings and suspended in place; portable derrick is used for erection.

Centrifugally Cast. Resistance Test of Centrifugally Cast Poles for Traction Equipment (Prove di resistenza su pali centrifugati per elettrotrazione), M. Manerba. Ingegneria, vol. 3, no. 9, Sept. 1, 1924, pp. 317-319, 5 figs. Discusses testing of new poles of Brescia-Tavernole street car line, showing their efficiency.

Norway. Power Transmission Line Towers of Reinforced Concrete (Kraftledningsmaster av jernbetong), J. Andresen. Teknisk Ukeblad, vol. 71, no. 40, Oct. 24, 1924, pp. 345-347, 11 figs. Construction, transportation, mounting, and foundation of reinforced-concrete poles for lines in Norway. Costs of construction of complete line.

Steel vs. Concrete or Lattice Poles? (Betonmast oder eiserner Gittermast?), L. David. Bauingenieur, vol. 5, no. 17, Sept. 15, 1924, pp. 538-540. Comparative efficiency of concrete and steel lattice poles; possibility of transportation; erection; etc.

POLES, STEEL

Erection. 228 Transmission Towers Built and Erected in 75 Working Days, H. A. Scribner. Elec. News, vol. 33, no. 11, June 1, 1924, pp. 61-62, 4 figs. Methods employed in erection of towers for 132,000-volt double circuit 27-mile tower line erected by Pub. Service Co. of Northern Illinois.

Foundations. Calculations of Foundations for Metallic Poles on Transmission Lines (Note sur le Calcul des Fondations des Poteaux Métalliques supportant des Lignes électriques), F. Baldini. Assn. des Ingénieurs Electriciens sortis de l'Institut Electrotechnique Montefiore—Bul., vol. 2, series 7, no. 4, Apr. 1924, pp. 151-156. Author examines matter theoretically and deduces formulas for use of designers; tables are given showing values of constants in formulas under different conditions of construction.

Girder, Foundations for. Report on Testing of Foundations for the Overhead Equipment at Gösgen (Bericht über die Erprobung der Fundamente von Freileitungstragwerken in Gösgen), G. Sulzberger. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, nos. 5 and 7, May and July 1924, pp. 185-202 and 313-321, 27 figs. Discusses tests with different foundations with view to revision of Swiss federal regulations regarding foundations for girder poles.

Girder, Guys for. Regulating Mechanical Tension of Cables (Le réglage des tensions mécaniques des cables), O. Bouvier and M. Bourseire. Génie Civil, vol. 85, no. 22, Nov. 29, 1924, pp. 497-500, 7 figs. Discusses control guys of girder poles for wireless antennas. Develops curves for graphic calculation.

POLES, WOODEN

Calculation. Calculation of Wooden Poles from Mechanical Viewpoint (Calcul des poteaux en bois au point de vue mécanique), P. Burdin. Revue Générale de l'Electricité, vol. 15, no. 18, May 3, 1924, pp. 799-805. Results of calculation, made

with aid of logarithmic tables, are given in tabular form and relate to poles of from 9 to 20 m. in height and from 20 to 35 cm. in diam.

Foundations. Wooden Poles (De l'Emploi des Supports en bois, etc.), Geo. Lumay. Société Belge des Electriciens—Bul., vol. 38, July 1924, pp. 205-215, 6 figs. Summarizes requirements of foundations and describes several types in use, including Forclum, Prée and Ponsolle sockets, Gaillard type, and Palix foundation extensively used in Switzerland and France.

Inspection. Systematic Inspection of Pole Lines, L. I. Bates. Elec. World, vol. 84, no. 25, Dec. 20, 1924, pp. 1313-1314. Cause of decay in wooden poles; general plan of inspection; directions for conducting work and records that should be kept. (Abstract.) Paper read before Empire State Gas & Elec. Assn.

Life and Maintenance of. Life and Maintenance of Poles, H. Rost. Telephony, vol. 86, no. 15, Apr. 12, 1924, pp. 28-31, 10 figs. Factors regarding life of wooden poles and their maintenance; various methods used to prevent decay; describes reinforced-concrete base support designed by author for increasing life of poles, and its advantages.

Line Calculation. Graphical Pole Line Calculations, J. L. Niesse. Telegraph & Telephone Age, no. 24, Dec. 16, 1924, pp. 566-570, 2 figs. Describes a simple and easy method of graphically calculating strength (factors of safety) of wood pole lines of standard construction as used in telegraph and telephone service.

Preservation. A New Method of Prolonging the Life of Poles, H. Rost. Elec. Traction, vol. 20, no. 3, Mar. 1924, pp. 134-136, 3 figs. Causes of failures of wooden poles for trolley lines, telegraph lines, telephone lines and power lines, importance of seasoning, preservative treatments, mechanical means of protection, setting in concrete, and description of a base support.

How Mexico Fights Pole Rot, H. Rost. Telephone Engr., vol. 28, no. 1, Jan. 1924, pp. 28-31, 7 figs. Discusses various methods of protection at Groundline; suggests concrete socket in place of usual earth setting of poles.

Impregnation of Wooden Poles by the Cobra Process (Holzmastenimprägnierung nach dem Cobraverfahren), R. Nowotny. Elektrotechnik u. Machinenbau, vol. 42, no. 34, Aug. 24, 1924, pp. 521-523. Discusses Cobra process using mainly sodium, fluoride and sodium nitrophenol with optional addition of arsenic compound.

Preserving Standing Poles, P. J. Howe. Telephone Engr., vol. 28, no. 12, Dec. 1924, pp. 20-21 and 42, 3 figs. Method in use by Western Union Telegraph Co. by charring and spraying with creosote oil. Good penetration is secured and profitable increase in life is expected. From paper read before Telegraph and Telephone Sec. of Am. Ry. Assn.

Prolonging the Life of Poles, P. J. Howe. Ry. Signaling, vol. 17, no. 11, Nov. 1924, pp. 448-451, 3 figs. Study of pole timber and methods of preservation both for new poles and those in service. (Abstract.) Paper presented before Telegraph & Telephone Section, Am. Ry. Assn.

Specification for the Preservative Treatment of Poles by Pressure Process. Wood Preserving News, vol. 2, no. 2, Feb. 1924, pp. 22-24, 6 figs. General requirements; preservatives, and amount to be used; treating operations.

Swedish Methods of Impregnating Poles, E. Hedenlund. Elec. World, vol. 83, no. 8, Feb. 23, 1924, pp. 373-375, 4 figs. New method involves charring pole and then treating it with creosote; relation between value of increased life and cost of impregnation; details of processes used in Sweden and conclusions as to best methods.

Substitutes for. Report of Sub-committee on Substitutes for Wood Poles, L. J. Corbett. Jl. of Elec., vol. 52, no. 11, June 1 1924, pp. 438-443, 14 figs. Data upon concrete poles, tubular steel poles and structural steel poles as complete substitutes, and concrete stubs as partial substitutes to which wood poles may be attached above ground line, including details of tests.

Transmission-Line. See ELECTRIC TRANSMISSION LINES, Wooden Poles for Long Spans.

Types. Wood in the Construction of Overhead Lines (Das Holz als Konstruktionsmaterial im Freileitungsbau). Maschinenbau, vol. 3, no. 30, Dec. 24, 1924, pp. 1173-1174, 2 figs. Construction of G. H. F. standard masts and Duplex masts, and advantages of wooden masts in economic maintenance of overhead lines.

POLISHING

Tumbling and Burnishing. Tumbling and Burnishing, B. G. Krause. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 501-502, 1 fig. Types of tumbling barrels; tumbling media of materials; ball-burnishing practice; plating and japanning; examples of work suitable for tumbling and burnishing.

PORCELAIN

Electrical. Electrical Porcelain: the Effect of Varying the Composition Upon Some of Its Properties, E. Watkin. Ceramic Soc.—Trans., vol. 23, part 3, 1923-24, pp. 185-205 and (discussion) 205-210, 8 figs. Details of investigation of specific resistance and dielectric strength, including effect of heat upon these two characteristics porosity and density determination, and mechanical strength.

Insulators. See INSULATORS, ELECTRIC, Porcelain.

Properties. Composition, Microstructure and Properties of Porcelain, (Composizione, microstruttura e proprietà della porcellana), Eugenio Alessandri. Elettrotecnica, vol. 11, no. 13, May 5, 1924, pp. 285-290, 23 figs. Notes on composition, fabrication, firing, and glazing; mechanical, thermal, and electrical properties, etc.

Technical. Contribution to the Better Knowledge of Genuine Hard Porcelain, K. H. Reichau. Ceramic Soc.—Trans., vol. 23, part 2, 1923-1924, pp. 145-155, 8 figs. Reviews methods and results of universal-optical tests, using microscope specially constructed for purpose by Zeiss and to determine if such results could be attained by other methods.

POROSIMETER. See BRICK, Porosity Determination.

PORTLAND CEMENT. See CEMENT, PORTLAND.

PORTS

Calcutta, India, Extensions. The Extension of the Port of Calcutta. Engineering, vol. 117, no. 3028, Jan. 11, 1924, pp. 37-40, 12 figs. partly on supp. plate. Describes construction of new King George's dock and new Riverside berths at Garden Beach.

Cherbourg, France. Improvements in the Port of Cherbourg (Les transformations du port de Cherbourg), A. Powlowski. Génie Civil, vol. 85, no. 18, Nov. 1, 1924, pp. 389-394, 5 figs. Discusses Cherbourg as a port of call for transatlantic passenger traffic; new maritime railway station, naval works, etc.

Development. See TERMINALS, MARINE.

Docks. See DOCKS.

Genoa, Mechanical Equipment. Mechanical

Equipment of the Port of Genoa and Other Ligurian Ports (Arredamenti meccanici nel Porto di Genova e in altri Porti Liguri), A. Albertazzi. Ingegneria, vol. 3, no. 1, Jan. 1, 1924, pp. 10-16, 11 figs. Details of the various types of hydraulic and electric wharf and floating cranes, capstans, etc., installed.

Havre, France. Extension Work in the Port of Havre (Les travaux d'extension du port du Havre), M. Michel-Schmidt. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 7-9, July-Sept. 1924, pp. 433-518, 100 figs., partly on supp. plates. Construction of 4 km. of dikes, 1000 quays in deep water, dockyards, floating docks, etc., for refitting of ships and accessories.

Königsberg, Germany. Traffic Questions of Königsberg (Königsberger Verkehrsfragen), Kutschke. Verkehrstechnik, vol. 41, no. 48, Nov. 28, 1924, pp. 619-623, 4 figs. Particulars of new harbor extensions and facilities, including free port.

La Rochelle, France. Enlarging the Port of La Rochelle (Les agrandissements du port de La Rochelle), A. Pawlowski. Génie Civil, vol. 85, no. 13, Sept. 27, 1924, pp. 265-269 6 figs. Details of extensions of La Pallice harbor facilities and La Rochelle fishing port.

Leghorn, Italy. Port of Leghorn. Times Trade & Eng. Supp., vol. 14, no. 300, Apr. 5, 1924, p. 93, 1 fig. New scheme of extension involves conversion of swamp into ample inland port, capable of being constructed in successive stages and coordinated simultaneously with development of an industrial area.

Lorient, France. The Port of Lorient (Les ports de Lorient), R. Tayon. Revue Universelle des Transports, vol. 1, nos. 7, 8, and 9, June 1, 15, and July 1, 1924, pp. 108-112, 122-126, and 132-136, 21 figs. Details of four ports; equipment and upkeep of fishing port.

Montreal. Development of the Port of Montreal, M. T. S. Casey. Can. Engr., vol. 47, no. 21, Nov. 18, 1924, pp. 513-518, 6 figs. Engineering works undertaken and completed recently; great expansion of grain elevator and conveyor system; new elevator at Tarte Pier; extension to elevator "B"; new piers and wharves constructed.

Paris, France. See HARBOR IMPROVEMENTS, Paris, France.

Planning. Port and City Planning, R. S. MacElwee. Wld. Ports, vol. 12, no. 10, Aug. 1924, pp. 57-79. Discusses the various problems to be considered, viz.: freight and passenger waterborne commerce for deep-sea, coastwise, or inland traffic; industries and the harbor; municipal requirements; and public benefits and amusements.

Rotterdam. The Maritime and River Port of Rotterdam [Le port maritime et fluvial de Rotterdam (Hollande)], A. Bijls. Génie Civil, vol. 85, nos. 23 and 24, Dec. 6 and 13, 1924, pp. 513-521 and 549-552, 108 figs. History and geographic position; description of present port, and projects for extensions; details of equipment.

Wharves. See WHARVES.

Yokohama. Rapid Strides Made In Yokohama Port Reconstruction, K. Koyanagi. Eng. News-Rec., vol. 93, no. 14, Oct. 2, 1924, pp. 552-554, 17 figs. Restoration of harbor facilities, made necessary through earthquake damage of Sept. 1923, includes extensive work on breakwater, piers, quays, and warehouses, to cost $10,000,000. Precast pier caissons and heavy steel girder sections are features.

POTASH

Alunite as Source. See ALUNITE, Uses.

Extraction from Orthoclase Feldspar. A Study of the Extraction of Potash From Orthoclase Feldspar by Carbon Dioxide and Sulphur Dioxide, E. F. Whyte. Nova Scotian Inst. Sci.—Proc. & Trans., vol. 15, part 3-4, Nov. 1923, 145-151. Historical review; description of method; results of experiments and brief description of apparatus used.

Manufacture from Leucite. The Manufacture of Potash and Other Salts from Leucite, J. W. Hinchley. Chem. & Industry, vol. 43, no. 7, Feb. 15, 1924, pp. 158-165 and (discussion) 165-168, 5 figs. Discusses use of leucite, found principally along line of Italian volcanoes, as raw material for manufacture of potash salts.

Production from Minnesota Shale. Possible Potash Production from Minnesota Shale, H. A. Schmitt. Economic Geology, vol. 19, no. 1, Jan.-Feb. 1924, pp. 72-83, 2 figs. Deals with problem of whether this shale has any commercial value because of its potash content, aside from its value for brick manufacture.

Recovery from Cement Dust. Potash from Cement Dust, E. J. Fox and C. W. Whitaker. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1044-1046. Deals with concentration by elutriation; fractions of cement dusts, potash contents of which are approximately double those of original materials, were obtained by air separation; in no instance was all the potash obtained in one fraction of material, regardless of size and fraction; in all fractions of given sample, potash content decreased as size of particles increased.

Russia, Extraction from Soil. Extracting Potash from Russian Soil, Jos. R. Minevitch and W. M. Malisoff. Chem. & Met. Eng., vol. 30, no. 13, Mar. 31, 1924, pp. 501-504, 2 figs. Development, economics, and engineering of industry that produced 20,000 tons of potash in year from sunflower stalks.

Salts from Kelp. Potash from Kelp, J. W. Turrentine and H. G. Tanner. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 242-248, 7 figs. Certain equilibria used in manufacture of potassium chloride from kelp brine.

Texas. The Potash of the Texas Panhandle, Chas. Wm. Dabney. Chem. Age (N. Y.), vol. 32, no. 1, Jan. 1924, pp. 37-38. Origin and extent; Government attitude toward development; potash in commerce and industry.

POWDERS

Classification of Grains. Proposal for Uniform Classification of Granulant and Pulverulent Materials (Projet d'une classification uniforme des matières grenues et pulvérulentes), R. Feret. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 136, no. 4, Apr. 1924, pp. 373-381. Definition of size of grains; proposed decimal classification.

Screen Testing. How Much Does Screen Testing Mean? R. B. Ladoo. Chem. & Met. Eng., vol. 31, no. 16, Oct. 20, 1924, pp. 623-626, 9 figs. States that fine powders cannot be tested by screening methods, because of many variables; mesh specifications are also shown to be inaccurate and meaningless when above certain limits.

POWER

Abbreviations. See ABBREVIATIONS.

Cost, Control of. See INDUSTRIAL PLANTS, Power-Cost Control.

Costs. See COTTON MILLS, Power Costs.

Developments. Lines of Development of Steam Engines and Prospects of Gas Engines and Turbines (Entwicklungslinien der Dampfkraftmaschinen und die Aussichten des Gasmaschinenbetriebes), H. Hoff. Stahl u. Eisen, vol. 44, nos. 46, 47, and 49, Nov. 13, 20, and Dec. 4, 1924, pp.

1437-1446, 1482-1488 and 1567-1575, 23 figs. Discusses development leading up to high-pressure steam engines; d.c. machines; thermodynamic and economic considerations; linking-up power and heat; development of steam turbine; superheating; development of gas engines; waste-heat utilization; prospects of gas turbine. Dec. 4: Discussion of paper.

Electric. See ELECTRIC POWER.

Industrial, Pittsburgh District. Industrial Power of the Pittsburgh District Outside That of the Iron and Steel Industry, S. B. Ely and W. F. Rittman. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 861-865, 10 figs. Facts and data relating to total industrial power of district; changes and trends in industrial power of district and their influence on its industry; relationship existing between power and population and tendency to develop further and further from congested centers.

Measurement. See DYNAMOMETERS.

New England Requirements. Power Requirements and Sources of Supply of New England, C. T. Main, H. I. Harriman and D. C. Jackson. Boston Soc. Civil Engrs.—Jl., vol. 11, no. 5, May 1924, pp. 193-227. Report of Committee of Associated Industries of Mass., covering kinds and amount of present power, cost, available new sources, probable demand for power from new sources, probable cost of supplying it, coal prices, fuel oil for power, Diesel engine: with summary and general conclusions.

Power Show, New York City. Third National Exposition of Power and Mechanical Engineering. Power, vol. 60, nos. 23 and 24, Dec. 2 and 9, 1924, pp. 899-904 and 940-948, 9 figs. Dec. 2: Includes alphabetical list of exhibitors at Power Show and their products. Dec. 9: Details of exhibits.

Resources. Power, F. R. Low. Power, vol. 60, no. 24, Dec. 9, 1924, pp. 937-939. Power resources at hand; notes on molecular action in furnace; absorption of heat from sun; results with early engines; lowest attainable steam consumption.

World Power Conference. First World Power Conference. Electrician, vol. 93, no. 2407, July 4, 1924, pp. 4-7. Details of opening ceremonies.

Proceedings of the First World Power Conference. Engineering, vol. 118, nos. 3053, 3054, 3055, and 3056, July 4, 11, 18, and 25, 1924, pp. 18-20, 35-47, 77-87, and 115-124, 3 figs. Abstracts of papers presented and discussions which took place at conference, held June 30 to July 12, 1924.

The First World Power Conference. Power, vol. 60, no. 5, July 29, 1924, pp. 160-165. Report of discussion at sessions dealing with world power resources, and steam generation and utilization of fuels.

The First World Power Conference. World Power, vol. 2, no. 7, July 1924, pp. 7-18. Detailed program and list of papers, June 30 to July 12, 1924.

The Significance of the First World Power Conference. World Power, vol. 2, no. 7, July 1924, pp. 1-6. Discusses object, focusing information on policy of main countries in development of power resources; evolution of international power policy; natural power resources.

POWER FACTOR

Correction. Causes and Consequences of a Low Power Factor in Electric Plants and Elimination of These Consequences (Die Ursachen und schädlichen Folgen eines niedrigen Leistungsfaktors in elektrischen Anlagen und die Mittel zur Bekämpfung dieser Folgen), M. Schiesser. Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 9, Sept. 1924, pp. 433-461, 33 figs. Physical causes of phase displacement; lines, transformers and motors, and their sphere in low power factor; suggests remedies.

Economics of Power-Factor Correction, R. C. R. Schulze. Elec. Wld., vol. 84, no. 24, Dec. 13, 1924, pp. 1247-1251, 8 figs. Where and why power-factor correction should be applied; method of computing cost and analysis of typical installations; recommendations for use as regards type and location of corrective equipment.

Power Factor Correction, R. A. Neal. Iron & Steel Engr., vol. 1, no. 10, Oct. 1924, pp. 564-565, 1 fig. States typical case covering application of a static or synchronous condenser; shows savings effected by use of static condenser.

Power-Factor Correction in Practice, L. W. W. Morrow. Elec. World, vol. 84, no. 21, Nov. 22, 1924, pp. 1096-1100, 4 figs. Use of static condensers for individual motor correction; what customers of results obtained.

Practical Ways to Correct Power Factor, H. B. Dwight. Elec. Wld., vol. 84, no. 23, Dec. 6, 1924, pp. 1199-1200. Use of synchronous motors advocated; their neglect by power companies; proposal that bonus be paid for each kva. installed; other methods; illustrative example.

Improvement. Different Methods of Improving Power Factor in Central Stations (Olika metoder för förbättring av effektfaktorn i kraftanläggningar), R. Liljeblad. Teknisk Tidskrift, vol. 54, no. 44, Nov. 1, 1924, pp. 190-194 (Elektroteknik), 11 figs. Describes methods of using synchronous motors, auto-synchronous motors, phase compensators, compensated induction motors, and static condensers, and discusses their comparative value.

Examples of Power Factor Improvement, M. G. Farrell. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1005-1008, 2 figs. Describes three practical ways of strengthening power factor in industrial plants.

Improvement of Power Factor (Der Leistungsfaktor in Drehstromnetzen und die Mittel zu seiner Verbesserung), K. Baudisch. Elektrotechnik u. Maschinenbau, vol. 42, no. 19, May 11, 1924, pp. 289-295, 15 figs. Considering improvement of low power factor on existing networks, author describes various practical methods, from large synchronous condensers to smallest power motors of special design, used today to compensate lagging current; explains and analyzes several new types of 3-phase motors operating with characteristics of synchronous machine; fact that all of them have commutator in addition to collector rings in general disadvantage of these motors, which are intended to replace simple and rugged squirrel-cage armature induction type; some of these "compensated" motors are manufactured for as little as 1½-kw. output.

Measurement. Simplified Power-Factor Measurement (Vereinfachte cos ϕ-Messung), L. Schüler. Elektrotechnische Zeit., special spring no., 1924, pp. 13-14, 4 figs. Describes how measurement can be carried out with sufficient accuracy for all practical purposes with unskilled personnel and without installation of a wattmeter.

Rate Clauses. Power-Factor Rate Clauses, R. R. Herrmann. Elec. World, vol. 84, no. 26, Dec. 27, 1924, pp. 1357-1359, 2 figs. It is shown that transformer and regulator costs are most affected by poor power factor; operating expenses increase slightly; rates should care for demand and energy charges; new rates advocated.

Unbalanced Three-Phase Circuits. Determination of Power Factors in Unbalanced Three-Phase Circuits (Sulla determinazione del fattore di potenza nei circuiti trifasi squilibrati), B. Focaccia.

Elettrotecnica, vol. 11, no. 13, May 5, 1924, pp. 291-295, 3 figs. Method devised by author.

POWER GENERATION

Earth's Internal Heat. Power from the Earth's Heat, T. T. Read. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 446-449, 8 figs. Discusses increase of earth's temperature toward its center. Gives résumé of published material about actual installations at favorable places on earth's surface, and plants proposed by well-known engineers for further development.

Economical Operation. Increasing Efficiencies in Power Generation, R. W. Angus. Power House, vol. 17, no. 4, Feb. 20, 1924, pp. 22-24, 3 figs. Improvements in economical operation of power by steam; modern trend to be toward higher pressures with less superheat, and multistage feedwater heating processes.

Steam. Modern Steam Power Generation, R. W. Angus. Univ. of Toronto Eng. Soc.—Trans. & Year Book, Apr. 1924, pp. 35-41, 3 figs. Discussion of developments in economical generation of power by steam made during past 10 years, including bleeding of steam from turbines, mercury turbines, etc.

POWER PLANTS

British Empire Exhibition. Power Plants at Wembley. Power Engr., vol. 19, no. 220, July 1924, pp. 256-268, 20 figs. Survey of prime movers employed at British Empire Exhibition to furnish power and lighting to exhibitors and for other necessary services.

Central Stations. See CENTRAL STATIONS.

Diesel-Engine. See DIESEL ENGINES, Power Plants, Use in.

Electric. See ELECTRIC PLANTS.

Equipment Purchasing. Purchasing Power Plant Equipment. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 795-796. Specifications must be complete and definite. Bids must be brought to a comparative basis analysis.

Hydroelectric. See HYDROELECTRIC PLANTS.

Management. State Versus Private Management of Power Plants, A. T. Hadley. Engineering, vol. 118, no. 3058, Aug. 8, 1924, pp. 209-211. Concludes that history of state management creates strong presumption against encouragement of government-owned electric plants. Abstract of paper read before World Power Conference.

Oil-Engine. See CENTRAL STATIONS, Diesel-Engined; FLOUR MILLS, Diesel-Engine-Driven.

Portland Electric Power Co. Completion of Oak Grove Project, W. A. Scott. Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 63-66, 11 figs. Power plant of Portland Elec. Power Co. is equipped with initial generating unit of 30,000 kva. capacity.

Railroad. A Model Oil-Burning Railroad Power Plant. Ry. Elec. Engr., vol. 15, no. 8, Aug. 1924, pp. 247-251, 9 figs. See also Ry. Age, vol. 77, no. 6, Aug. 9, 1924, pp. 237-240, 9 figs. Power plant of Missouri, Kansas & Texas at Parsons, Kan., provides steam, air, and electric power for railroad terminal; electric power is developed by two bleeder-type turbine-generator sets; discusses power machinery, turbine generators, air compressors and fire pumps, flowmeters, motor-generators, etc.

Steam. See STEAM POWER PLANTS.

POWER TEST CODES

Condensing Apparatus. See CONDENSERS, STEAM, Test Code.

Gas Producers. See GAS PRODUCERS, Test Code for.

Governors, Speed-Responsive. See GOVERNORS, Speed-Responsive, Test Code for.

Solid Fuels. See FUELS, Solid, Test Code for.

POWER TRANSMISSION

Belt Drive. See BELT DRIVE.

Belt vs. Electric. Mechanical Conduction of Energy (Mechanische Energieleitung), M. Pollak. Dinglers Polytechnisches Jl., vol. 339, no. 17, Sept. 1924, pp. 167-169, 4 figs. Considers advantage of individual electric-motor drive largely due to neglect in group transmission drive, and suggests improvements in lubrication, couplings, etc.

Chain Drive. See CHAIN DRIVE.

Couplings. See COUPLINGS.

Electric. D.C. versus A.C., A. Scherbius. Electrician, vol. 92, no. 2383, Jan. 18, 1924, p. 70. Comparison of the two systems for transmission purposes. Abstract from Elektrotechnische Zeit.

Transmission of Electric Power From Norway to Denmark, A. R. Angelo. Engineering, vol. 118, no. 3055, July 18, 1924, p. 114. In 1921 three commissions were appointed, one by Danish, one by Norwegian, and one by Swedish State, with object of investigating question of transmission of electric power from Norway to Denmark. Main points of report submitted in 1923 by a Joint Comittee elected by these commissions for investigation of technical and financial aspects of the matter. Paper, abridged, contributed to World Power Conference.

See also ELECTRIC POWER, Transmission.

Gears. See GEARS.

Hydraulic Drive. See HYDRAULIC DRIVE.

Losses, Elimination of. See INDUSTRIAL PLANTS, Power-Transmission Losses.

Shafting and Shaft Hangers. Things to Know About Lineshafting and Hangers, F. E. Gooding. Indus. Engr., vol. 82, no. 4, Apr. 1924, pp. 178-182 and 211, 5 figs. Characteristics of lineshafting produced by various methods of manufacture, and different designs of hangers in common use.

Wave. The Transmission of Energy through Oscillating Liquid Columns (Energieübertragung durch schwingende Flüssigkeitssäulen), P. v. Vágò. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 113-124, 5 figs. Development of hydrodynamics of a.c. power transmission and confirmation of analogy between hydrodynamic and electrodynamic phenomena, first discovered by Constantinesco.

Wave-Power Transmission, E. A. Barclay-Smith. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. of Sci., vol. 48, no. 283, July 1924, pp. 97-109, 9 figs. Discusses phenomena occurring in wave-power transmission through liquids in Constantinesco system.

Wave Transmission of Power, H. Moss. Instn. Mech. Engrs.—Proc., no. 1, 1924, pp. 1-14 and (discussion) 15-24, 6 figs. Account of elements of Constantinesco system of hydraulic transmission, and results of tests; elements of theory; power and efficiency calculations.

PRECIPITATION

Cottrell Process. Cottrell Electrical Precipitation Process, A. Stansfield. Fuels & Furnaces, vol. 2, nos. 3 and 4, Mar. and Apr. 1924, pp. 269-271 and 361-364, 2 figs. Review of various methods of cleaning gases with detailed account of application of Cottrell precipitator to blast-furnace gases; approximate cost and savings possible.

Dust, Electrical. See DUST, Precipitation, Electrical.

Electrical. Electric Purification of Gas, E. L.

Heidenreich. Concrete, vol. 25, no. 6, Dec. 1924, pp. 107-109, 13 figs. Notes on Lurgi and Oski methods. Extract from articles by H. Nitzsche in Tonindustrie-Zeitung, and E. Oppen in Zement.

Electrical Precipitation, Oliver Lodge. Elecn., vol. 93, no. 2425, Nov. 7, 1924, pp. 523 and 529. Discusses natural and artificial methods. (Abstract.) Lecture before Inst. Physics.

Electrical Precipitation in Retrospect, W. A. Schmidt. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1038-1041, 5 figs. Discussion, with especial reference to service which has been performed by some of older installations; investigations at plant of Riverside Portland Cement Co.; other developments.

Fundamentals of Electrostatic Precipitation. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 755-757, 6 figs. Application of Cottrell process for precipitation of dust particles from gases by means of an electrostatic field has been recently made at Trenton Channel power station of Detroit Edison Co., for precipitation of flue dust from gases of combustion of pulverized-fuel furnaces. Gives description of process from this point of view.

See also Cottrell Process; GAS MANUFACTURE, Tar Removal.

PRESSED METAL

Automobile Uses. See AUTOMOBILES, Pressed-Metal Parts.

PRESSES

Accident Prevention on. See ACCIDENT PREVENTION, Industrial.

Classification. Classification of Power Presses, F. R. Daniels. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 617-618, 7 figs. Advocates classification by style of frame, because use to which a press may be put and method of moving gate may be varied; describes machines built by Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., the names given them being those applied by this company.

Coining, Forging in. Coining-Press Operation, A. R. Kelso. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 399-406, 19 figs. See also (abstract) in Am. Mach., vol. 61, no. 18, Oct. 30, 1924, pp. 685-688, 11 figs. Outlines development and tells how such machinery was adapted to speed up production of automobile parts, such as forged arms and levers, by squeezing process that superseded milling or spot-facing methods; details of squeezing operations and increase in production over that attained under former methods; photomicrographs showing grain structure of coin-pressed forgings.

Drawing. Press for Motor-cycle Mud Guards. Machy. (Lond.), vol. 24, no. 611, June 12, 1924, p. 348, 1 fig. Double-crank toggle press installed in works of Raleigh Cycle Co., Nottingham, for drawing and forming motorcycle mud guards at one operation.

Ejectors for. Ejectors for Punches and Dies, H. M. Groff. Machy. (N. Y.), vol. 30, no. 8, Apr. 1924, pp. 608-609, 3 figs. Describes different devices employed for ejecting parts from punches and dies of power presses.

Hydraulic. Hydraulic Presses and Pumps (Hydraulische Pressen und Pumpen), E. Feyer. Werkstattstechnik, vol. 18, no. 11, June 1, 1924, pp. 289-293, 15 figs. Describes types manufactured by M. Hasse & Co., Berlin, Germany.

See also HYDRAULIC PRESSES.

Hydraulic, Platen Design. The Design of Hydraulic Press Platens. Machy. (Lond.), vol. 24, no. 662, Aug. 28, 1924, pp. 693-694, 2 figs. Suggestions on designing of platens; table giving suitable proportions for a range of circular platens capable of withstanding working loads of from 50 to 300 tons.

Inclinable. Design of Inclinable Power Presses, P. A. Friedell. Machy. (N. Y.), vol. 30, nos. 6 and 8, Feb. and Apr. 1924, pp. 442-445 and 626-628, 5 figs. See also Machy. (Lond.), vol. 24, no. 613, June 26, 1924, pp. 409-411, 1 fig. Feb.: Proportioning mechanical knockout, legs, and inclining mechanism for power plants. Apr.: Calculations for designing gearing, driving shaft, backshaft bearing, flywheel and pulleys.

Power. Automatic Power Presses. Machy. (Lond.), vol. 24, no. 618, July 31, 1924, pp. 545-550, 11 figs. Details of exhibition at Wembley, stagger presses for blanking and drawing from sheet stock at one stroke of press ram, incorporating Berry patent single-action deep-draw mechanism, automatic hinge press, etc.

See also Classification.

Quantity-Production, Manufacture of. Making Power Presses for Quantity Production, H. P. Armson. Can. Machy., vol. 31, no. 5, Jan. 31, 1924, pp. 13-17, 3 figs. Description of methods employed in plant of Brown, Boggs Co., Hamilton, Can., with particular reference to inclinable type.

PRESSURE GAGES.

See MANOMETERS.

PRESSURE VESSELS

Mouthpiece Rings for. Designing Flanged Mouthpiece Rings of Vulcanizers and Similar Pressure Vessels. Boiler Maker, vol. 24, no. 2, Feb. 1924, pp. 55-60, 24 figs. Deals with strength of flanged ring which is riveted to main shell of vessel.

Unfired, Code for. Report on Code for Unfired Pressure Vessels. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 916-923, 5 figs. Final report; A.S.M.E. boiler-construction code.

Unfired, Mouthpiece Rings for. Calculating the Stress in Mouthpiece Rings for Unfired Pressure Vessels. Boiler Maker, vol. 23, no. 16, Oct. 1924, pp. 287-291. Discusses internal stresses, distribution of circumferential stresses, and other forces acting on ring. Reprinted from Locomotive.

Welding. See OXY-ACETYLENE WELDING, Pressure Vessels.

PRESSURES

Measurement. See FLUIDS, Pressure Measurement.

PRESSWORK

Drawing-Press Tools. The Calculation of Draw-Press Tools (Die Berechnung von Ziehwerkzeugen), W. Sellin. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 229-235, 10 figs. Discusses most accurate method of determining diameter of blank; calculation of punch diameter; development of proper relation between diameter of shell and drawing depth.

Methods. Questions as to Materials in the Production of Pressed Metal Parts (Werkstoffragen bei der Herstellung von Metallpressteilen), H. Obermüller. Zeit. für Metallkunde, vol. 16, nos. 6 and 8, June and Aug. 1924, pp. 229-235 and 308-311, 42 figs. Discusses process of making pressed metal parts, and dies for same, also properties of alloys, especially copper-zinc, and gives practical examples of failures in production of pressed metal parts, showing how to avoid mistakes.

Pressed-Metal Production. Pressed-Metal Engineering, D. P. Cook. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 123-128, 12 figs. Diversity and complexity of process; rapid growth of industry; lack of engineering standards and information; possibilities and limitations of press production; examples of pressed-metal design. (Abridged.)

Pressed-Metal Production. Machy. (Lond.), vol. 24, no. 611, June 12, 1924, pp. 328-331, 6 figs. Practice of Fisher & Ludlow, Birmingham, featuring combination tools, deep-drawn work, and pressings to replace castings.

Pressed Steel, Applications of. The Development of Modern Stamping Practice, W. W. Galbreath and J. R. Winter. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 17-19, 6 figs. Early uses of pressed metal; pressed steel in automobile field; replacement of cast-iron parts by pressed steel; various applications of pressed steel. (Abridged.)

Sheet-Steel Punchings. The Cost of Sheet Steel Punchings, F. C. Lawrence. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 397-598, 3 figs. Review of methods more commonly adopted for pricing material in punchings, and suggestions for alternative which is free from their shortcomings.

PRINTING

Lithographing. See LITHOGRAPHING.

PRINTING MACHINERY

Railway Tickets. Ticket Printing and Numbering Installation of Société des Transports en Commun de la Région Parisienne, at Malakoff (Installation de l'imprimerie de tickets et de numeros d'appel de la Société T.C.R.P., à Malakoff), M. Lorin. Industrie des Tramways, vol. 18, no. 214, Oct. 1924, pp. 386-391, 14 figs. Technical details of machines employed, which consist principally of rotary machines for large and small production.

PRODUCER GAS

Analysis. Analysis of Producer Gas and Determination of Oxide of Carbon (Analyse des gaz de gazogènes et dosage de l'oxyde de carbone), Ch. de La Condamine. Chaleur et Industrie, vol. 5, nos. 53, 54, and 55, Sept., Oct., and Nov., 1924, pp. 478-486, 526-537 and 586-590, 21 figs. Report to Société de Physique Industrielle on methods of analysis of industrial gas and particularly CO content, including sampling, particulars of apparatus, reagents used for absorbing gases, etc., tests in Orsat apparatus with cuprous chlorides.

Producer Gas, R. T. Haslam. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 782-784, 2 figs. Apparent equilibrium between its constituents and influence of depth of fuel bed.

Automobile Fuel. See AUTOMOBILE FUELS, Producer Gas.

Combustion, Excess-Air Determination in. A Graphical Chart for Determining Excess Air in the Combustion of Producer Gas, G. M. Peltz. Am. Ceramic Soc.—Jl., vol. 7, no. 6, June 1924, pp. 437-441 and (discussion) 441-443, 1 fig. Presents a calculating chart by which it is possible to determine percentage of excess air existing in any producer gas fired furnace when analysis of gas and percentage of CO_2 in products of combustion are known.

Factory Power and Heating. Gas for Power and Heating. Power Engr., vol. 19, no. 216, Mar. 1924, pp. 99-105, 12 figs. Describes Raleigh's Cycle Co.'s power and heating plant; factory uses suction and producer gas for whole of its heat-treatment processes, and as fuel for its prime movers.

Heating, Value. The Calorific Value of Producer-Gas by Graph, A. Levesley. Fuel, vol. 3, no. 12, Dec. 1924, pp. 422-423, 3 figs. Reproduces graph designed with object of eliminating rather lengthy and monotonous calculations ordinarily necessary to determine net value of producer gas in B.t.u. per cu. ft. from its analysis.

Hydrogen and Methane in. See GAS ANALYSIS, Hydrogen and Methane in Producer Gas.

Hydrogen in. Determination of Hydrogen in Producer Gas. Fuels & Furnaces, vol. 2, no. 2, Feb. 1924, pp. 167-168. Percentage of hydrogen in gas serves as guide in successful producer operation; thermal conductivity of hydrogen used as basis for its continuous physical analysis.

Illuminating Gas Substitutes. Using Producer Gas as a Substitute for Illuminating Gas (Benutzung des Generatorgases als Leuchtgasersatz in Eisenbahnwerkstätten). Wärme, vol. 47, no. 37, Sept. 12, 1924, pp. 427-429, 3 figs. Discusses use of producer gas for forges in railway repair shops, which has been found suitable for all purposes for temperatures up to 1600 deg. cent.; it may be made from peat, brown coal, or other low-grade fuel.

Producers. See GAS PRODUCERS.

Utility of. Producer Gas as an Industrial Fuel, D. J. Demorest. Chem. & Met. Eng., vol. 31, no. 15, Oct. 13, 1924, pp. 578-581, 3 figs. Consideration of its utility and economics obtained through its proper use.

PROFILING. See MILLING MACHINES, Attachments.

PROFILOMETERS. See PAVEMENTS, Surface Testing.

PROFIT SHARING

English Plans. Profit Sharing. Monthly Labor Rev., vol. 19, no. 5, Nov. 1924, pp. 241-242. English profit-sharing and copartnership schemes in 1923.

The Case for Profit Sharing. Indus. Mgmt. (Lond.), vol. 11, no. 18, Dec. 1924, pp. 499-501. Describes scheme for increasing output, reducing costs, and curtailing waste by providing employees with share of savings, etc.

France. Profit Sharing. Monthly Labor Rev., vol. 18, no. 5, May 1924, pp. 222-223. Profit sharing in France.

Profit-Sharing and Recent French Legislation, P. Pic. Int. Labour Rev., vol. 10, no. 1, July 1924, pp. 1-29. Discusses act passed by French Parliament in 1922 for joint stock companies with profit-sharing schemes, and reluctance in its application.

Why Our Workmen Produce 30% More Than They Did, E. Romanet. Factory, vol. 33, no. 6, Dec. 1924, pp. 782-785, 836 and 838, 1 fig. Describes form of organization established at Joya Establishments at Grenoble, France, workshops for making hydroelectric equipment, steam boilers, autoclaves, caissons, bridges, etc.; how profits are distributed; it has been proved at factory that profits of capital will be much greater when it is planned to give greater share to workmen.

PROJECTILES

Effect of Wind Upon. Experimental Investigation of the Effect of Wind Upon the Motion of a Projectile, P. Schwartz. Coast Artillery Jl., vol. 60, no. 2, Feb. 1924, pp. 93-97, 1 fig. Results of test carried out which consisted in firing two guns whose azimuth of fire differed by 180 deg., almost simultaneously and over about same area; gun firing with wind had its range or deflection increased, and one firing against wind had a corresponding decrease.

Flight of, Photographing. See CAMERAS, Photographing Moving Projectiles.

Spinning, Drift of. On the Drift of Spinning Projectiles, J. W. Campbell. Roy. Soc.—Proc., vol. 106, no. A-737, Sept. 1, 1924, pp. 222-232, 1 fig. Discusses case of drift of spinning projectiles where yaw and inclination of axis of projectile to plane of fire do not become too great.

PROPELLERS

Airplane. See AIRPLANE PROPELLERS.

Ship. See SHIP PROPELLERS.

PROSPECTING

Aircraft, Use of. The Use of Aircraft in Mineral Exploration and Development, C. C. Mackenzie. Can. Inst. Min. & Metallurgy—Bul., no. 150, Oct. 1924, pp. 675-704 and (discussion) 704-706, 3 figs. Discusses possibilities of utilizing aircraft in exploring new country and hastening development of latent resources.

Copper. See COPPER, Prospecting.

Electrical. Electrical Methods of Prospecting, A. L. Flagg. Ariz. Min. Jl., vol. 8, no. 3, July 1, 1924, pp. 5-6 and 34, 7 figs. Methods used and results obtained by electrical prospecting.

Electrical Prospecting by the Lindblad-Sundberg-Vos Methods. Min. Mag., vol. 31, no. 6, Dec. 1924, pp. 346-349, 9 figs. Particulars of prospecting methods developed by Centralgruppen Emissions A. B., a company consolidated with Elektrisk Malmletning A. B., which developed Lundberg-Nathorst process.

Electrical Prospecting in Canada, S. F. Kelly. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 166-187, 14 figs. See also Am. Zinc Inst.—Bul., vol. 7, no. 5, May 1924, pp. 21-39, 14 figs. Principles underlying Schlumberger's first method of electrical prospecting and later improvements; application to Canadian deposits; prerequisites for success; Conklin's method.

The Eötvös Torsion Balance. Colliery Guardian, vol. 128, no. 3326, Sept. 26, 1924, p. 812, 1 fig. Describes gravity balance for geological surveys.

Electro-Aeronautic. Electro-aeronautic Investigation of the Interior of the Earth (Elektroaviatische Erforschung des Erdinnern), Taussig. Elektrotechnik u. Maschinenbau, vol. 42, no. 46, Nov. 16, 1924, pp. 666-668. Details of Löwy method based on principle of exciting electric oscillations in a conductor and measuring their duration. Describes capacity method and reflection method. Application from airships in arid regions for finding water and ore.

Geological Research Work, Need of. Immediate Need of Geological Research Work That Will Aid Prospectors in Finding New Mines, L. Balliet. Salt Lake Min. Rev., vol. 26, no. 6, June 30, 1924, pp. 11-15, 3 figs. Discusses need of immediate and widespread geological research on occurrence of minerals and oil; gives geology of Tonopah district.

Geophysical Methods. What Are the Merits of Geophysical Investigating Methods? (Welchen Nutzen bringen die geophysikalischen Untersuchungsmethoden den Bergbautreibenden?), G. Glockemeier. Metall u. Erz, vol. 21, nos. 8 and 9, Apr. and May 1924, pp. 165-173 and 189-202, 32 figs. Discusses purpose, theory, apparatus, and application of magnetic, gravitometric, and electric investigating methods, and gives typical examples.

Methods. Notes on Scientific Prospecting, H. F. Lunt. Mineral Age, vol. 9, no. 2, Feb. 1924, pp. 9-10 and 22. Describes processes and apparatus which have been used with success.

Prospecting, V. Dolmage. Can. Min. Jl., vol. 45, no. 17, Apr. 25, 1924, pp. 391-396. How the great problem of mining industry is being solved. Describes methods, including Schlumberger and Lundberg-Nathorst electrical methods, and Eötvös Torsion Balance method.

Searching the Interior of the Earth's Crust, A. Gradenwitz. Eng. & Min. Jl.-Press, Vol. 118, no. 2, July 12, 1924, pp. 54-56, 3 figs. Résumé of methods used for determining presence of orebodies at distance by electrical, magnetic, and other means.

Radio. Prospecting by Radio, W. C. Riley. Eng. & Min. Jl.-Press, vol. 118, no. 19, Nov. 8, 1924, pp. 733-734, 2 figs. Development and possibilities of electrical investigations by this method.

PROTECTIVE COATINGS

Aluminum. See ALUMINUM, Protective Coatings for.

Galvanizing. See GALVANIZING.

Metal Spraying. See METAL SPRAYING.

Metals. See METALS, Protective Coating of.

Paints. See PAINTS.

Varnishes. See VARNISHES.

PRUSSIAN BLUE. See COAL GAS, Prussian Blue from.

PSYCHOLOGICAL TESTS

Employment Psychology. Employment Psychology, V. M. Cady. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 277-279. Discusses application of tests to employment, non-intelligence tests or those that concern morality and emotionality, and use of some standard method of testing out industrial possibilities of employee after he has been accepted into organization.

PSYCHOLOGY.

Industrial. See INDUSTRIAL MANAGEMENT, Psychology in Industry.

PUBLIC UTILITIES

Accounting for. See ACCOUNTING, Public-Utility.

Properties Valuation. Three Recent Decisions of the United States Supreme Court, Upon Valuation, L. Metcalf. Am. Water Wks. Assn.—Jl., vol. 11, no. 1, Jan. 1924, pp. 1-16. Decisions on valuation of public utility properties handed down in Southwestern Bell, Bluefield Water Works, and Georgia Ry. & Power Co. cases.

Regulation. Shall Public Utility Service Be Rendered by Regulated Monopolies, W. A. Shaw. West. Soc. Engrs.—Jl., vol. 29, no. 11, Nov. 1924, pp. 416-426 and (discussion) 426-430. Gives graphic picture of growth of public-utility services and brief history of efforts toward regulation.

PULLEYS

Belt. Faults in Construction and Production of Belt Pulleys (Konstruktions- und Herstellungsfehler bei Riemenscheiben), M. Markmann. Maschinenbau, vol. 3, no. 17, June 12, 1924, pp. 618-621, 4 figs. Criteria for high-speed belt pulleys; production of wrought and cast-iron pulley; tests with 19 belt pulleys.

Clutch. See ELECTRIC MOTORS, A. C., Starting.

Cone. The Calculation of Cone-Pulley Diameters, H. E. Merritt. Mech. Wld., vol. 76, no. 1961, Aug. 1, 1924, pp. 66-67. Details of calculation for crossed belts and its application to open belts by means of correction determined to high degree of accuracy by simple slide-rule calculation.

Loose, Defects of. Overcoming the Defects of the Loose Pulley, H. Bentley. Can. Machy., vol. 32, no. 6, Aug. 7, 1924, pp. 37 and 48, 4 figs. Reduction of belt tension and increase in bearing area important factors in eliminating overheating and excessive wear.

Machining. Machining Pulleys on a Big Production Bases, A. E. Granville. Can. Machy., vol. 31, no. 6, Feb. 7, 1924, pp. 27-30, 13 figs. Methods employed by different shops to expedite work vary in accordance with equipment available and ideas of men in charge.

Pressed-Metal, Manufacture. Application of Pressed Metal to Pulleys, S. G. Gaillard, Jr. Forging—Stamping—Heat Treating, vol. 10, no. 6, June 1924, pp. 226-229, 12 figs. Various operations in manufacture of pressed-steel belt pulleys.

Redesigning a Pressed Metal Pulley, E. Panek.

Forging—Stamping—Heat Treating, vol. 10, no. 3, Mar. 1924, pp. 129-130, 8 figs. Eight operations eliminated in manufacture of pulley by change of design and addition of one more part; strength and appearance materially improved.

PULVERIZED COAL

Advantages. Advantages in Burning Pulverized Coal, F. L. Wolf. Steam Coal Buyer, vol. 2, no. 2, Sept. 1924, pp. 22 and 24, 1 fig. Practical description showing why pulverized coal gives more perfect combustion, with figures on comparative costs.

Anthracite Slush. See STEAM POWER PLANTS, Pulverized Anthracite-Slush-Burning.

Boiler Firing. An Investigation of Powdered Coal As Fuel for Power-Plant Boilers, H. Kreisinger, J. Blizard, C. E. Augustine, and B. J. Cross. U. S. Bur. Mines—Bul. 223, 1923, 90 pp., 48 figs. Results of 36 tests made on a 468-hp. Edge Moor boiler fired with pulverized coal at Oneida St. Station of Milwaukee Elec. Ry & Light Co., Milwaukee, Wis., to determine what overall boiler efficiency could be obtained with pulverized coal under various conditions of furnace operation and with coal of different fineness and moisture content.

Application of Pulverized Coal to Boilers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 71-72, 2 figs. Preparation of fuel; storage of dry pulverized coal; importance of furnace design; ash removal facilitated by water screens; safety rules.

Burning Low-Grade Fuels in Pulverized Form, E. K. Scott. Colliery Guardian, vol. 127, no. 3297, Mar. 7, 1924, pp. 607-608 (includes discussion). Particulars of some of the largest boilers in world designed for working with pulverized fuel firing on Lopulco system; particulars of power stations in France and Belgium which are being equipped with boilers to burn pulverized fuel; application to colliery boilers; colliery coal dust as pulverized fuel.

Economic Interest of Use of Pulverized Coal in Boilers (Intérêt économique de l'emploi du charbon pulverisé dans les foyers de chaudières), M. de Vathaire. Revue de l'Industrie Minérale, no. 91, Oct. 1, 1924, pp. 469-480. Fineness of pulverization; efficiency of pulverized coal; boiler tests; comparison with other kinds of firing.

Experience with Coal Dust and Combustion of Pulverized Coal (Les expériences sur les poussières de houille et la combustion du charbon pulvérisé), J. A. de Grey. Revue Universelle des Mines, vol. 2 (series 7), no. 5, June 1, 1924, pp. 276-283, 2 figs. Discusses principle of burner construction, combustion chamber, use of low-grade fuels and mixtures.

Further Development of Pulverized-Coal Firing (Die Aussichten für die Weiterentwicklung der Kohlenstaubfeuerung), F. Wintermeyer. Feuerungstechnik, vol. 13, no. 5, Dec. 1, 1924, pp. 47-50. Discusses further development of burners, combustion chamber, ignition, etc.; examples of recent construction types.

Powdered Coal Firing for Water-Tube Boilers and Metallurgical Furnaces, H. W. Hollands. Instn. Mech. Engrs.—Proc., vol. 2, no. 6, 1923, pp. 1143-1151, 6 figs. Describes unit system, which consists of one pulverizer per boiler or furnace, and points out its advantages; coal drying; savings in use of pulverized coal. (Abridged.)

Powdered Coal for Small Boiler Plants, T. W. Atterbury. Power Plant Eng., vol. 28, nos. 18, 19 and 20, Sept. 15, Oct. 1 and 15, 1924, pp. 937-939, 996-999, and 1048-1050, 12 figs. Describes unit pulverizer method of pulverizing and firing; system makes powdered coal an economical fuel for plant with few boilers; analysis of operating costs; comparative advantage and desirable characteristics of unit pulverizer.

Pulverized-Coal Boiler Performance, Brunot Island Power Station, L. W. Heller. Power, vol. 60, no. 16, Oct. 14, 1924, pp. 600-603, 9 figs. States that 22 months of operation has shown that this method of burning Pittsburgh coal has operating characteristics that are desirable and will be dominating factors in selection of furnace equipment in future; general arrangement and operating performance.

Pulverized-Coal Firing (Le chauffage des chaudières au charbon pulverisé), M. Sohm. Arts et Métiers, vol. 77, no. 48, Sept. 1924, pp. 338-347, 11 figs. Discusses advantages and application in various industries; describes plant of Bruay Min. Co., and gives operating data; diagrams.

Pulverized-Coal Firing Plant at the Friedrich Ernestine Mine (Die Kohlenstaubfeuerungsanlage auf der Zeche Friedrich Ernestine), K. Hold. Glückauf, vol. 60, no. 50, Dec. 13, 1924, pp. 1175-1179, 4 figs. Describes new plant and shows from results of tests and operations that there is a 30 per cent better utilization of fuel and considerable saving in labor.

Pulverized-Coal Firing and Its Economic Significance (Die Kohlenstaubfeuerung und ihre wirtschaftliche Bedeutung), F. Wintermeyer. Bergbau, vol. 37, nos. 14 and 15, July 10 and 24, 1924, pp. 356-363 and 399-400, 4 figs. Discusses production of pulverized coal, conveying, combustion, advantages, and application to boiler firing.

Pulverized Fuel for Boilers, W. M. Selvey. Colliery Guardian, vol. 128, no. 3316, July 18, 1924, pp. 157-158. Discusses fuel, preparation, burners, absorption of heat, and application to British condition. Abstract of paper read before World Power Conference.

Pulverized Fuel—Its Utilization in the Industries, C. F. Herington. Combustion, vol. 10, nos. 3 and 5, Mar. and May 1924, pp. 199-201 and 347-348, 2 figs. Mar.: Its adaptation to steam boilers using Lopulco system. May: How to operate a pulverized-coal plant.

Status of Pulverized-Coal Firing for Boilers in Germany (Stand der Kohlenstaubfeuerungen für Dampfkessel in Deutschland), Fr. Schulte. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 39 and 41, Sept. 27 and Oct. 11, 1924, pp. 1021-1025 and 1071-1074, 16 figs. Special characteristics of pulverized-coal firing; combustion process; ignition; furnace design; lining; slag and ash removal; description of installations; experimental results; economy.

See also BOILER FIRING, Pulverized Coal.

Calculations. Calculations Respecting Pulverised Fuel, E. Kilburn Scott. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 148 and 157. Also Combustion, vol. 10, no. 5, May 1924, pp. 360-361. Elementary considerations regarding use of pulverized fuel, arranged as calculations.

Cement Industry. See CEMENT MILLS, Pulverized Coal, Use of.

Central Stations. See CENTRAL STATIONS, Comines, France; Pulverized-Coal-Burning; St. Louis, Mo.

Combustion. Combustion Devices for Powdered Coal, W. Trinks. Fuels & Furnaces, vol. 2, nos. 5, 6, 7, 8, and 9, May, June, July, Aug., and Sept. 1924, pp. 449-452, 553-556, 663-666, 783-786, and 951-952, 17 figs. May: Theory of powdered-coal burning. June: Feeding devices and feeders. July: Low- and high-pressure burners. Aug. and Sept.: Capacity of burners and method of regulation.

Experimental Investigation of the Combustion of Pulverized Coal (Etude expérimentale de la combustion du charbon pulvérisé), E. Audibert. Revue de l'Industrie Minérale, no. 73, Jan. 1, 1924, pp. 1-32, 16 figs. Points out that primary reason for large combustion chambers is abnormal temperature otherwise reached by brickwork; it is

suggested that combustion chamber should be in two compartments, viz., an ignition chamber of very refractory bricks, impermeable to heat, and main combustion chamber with walls permeable to heat; heat passing through latter could be recovered by means of water jacket through which passes feedwater. See also (translation) Colliery Guardian, vol. 127, nos. 3306 and 3307, May 9 and 16, 1924, pp. 1188-1189 and 1251-1252, 4 figs.

Phenomenon of Combustion in Pulverized-Coal Firing (Der Verbrennungsvorgang bei der Kohlenstaubfeuerung), F. Schulte. Glückauf, vol. 60, no. 43, Oct. 25, 1924, pp. 971-978, 4 figs. Pulverizing; degree of fineness; ignition temperature of fuels; process of combustion; ignition; combustion of gas and coke of pulverized coal-ash content; proper firing, etc.

The Combustion Process in Pulverized-Coal Furnaces (Der Verbrennungsvorgang in der Kohlenstaubfeuerung), Wm. Nusselt. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 6, Feb. 9, 1924, pp. 124-128. Points out that process of combustion falls in two parts, both of which are explained; by use of law of heat transmission and diffusion, formulas are obtained for both parts of process, so that time of ignition and duration of combustion of blown-in fuel can be calculated.

Conveying System. See CONVEYORS, Pulverized-Material.

Developments. Pulverized Fuel. Nat. Elec. Light Assn.—Serial Report of Prime Movers Committee, Sept. 1924, 32 pp., 39 figs. Recent developments. Refinements in design and reliability of apparatus have been accomplished. Statements of operating companies and manufacturers, indicating progress, present trend in design and results obtained; progress in Europe.

Pulverized Fuel and Efficient Steam Generation, D. Brownlie. Instn. Elec. Engrs.—Jl., vol. 62, no. 329, May 1924, pp. 385-418 and (discussion) 418-469, 1 fig. Detailed consideration of latest developments in use of pulverized coal for steam generation, and comparison of its advantages and disadvantages as compared with mechanical stoking under most modern conditions; full account of Lakeside station at Milwaukee with exact working costs, and description of River Rouge plant at Dearborn, Detroit, as representatives of modern pulverized-fuel practice; comparison with Dalmarnock power station, Glasgow, characteristic of best British mechanical-stoker practice; in author's opinion advantages of pulverized fuel are so great that they constitute almost revolution in boiler practice.

Economies. Economies to Be Derived from Pulverized Fuel, H. D. Savage. Engrs. & Eng., vol. 41, no. 10, Oct. 1924, pp. 261-265 and (discussion) 265-268, 1 fig. Possible economies; stoker and pulverized-fuel firing compared; burning inferior coal.

Explosion Hazard. See COAL DUST, Explosions.

Forging and Rolling-Mill Furnaces. The Problem of Pulverized Coal (Zur Kohlenstaubfrage), W. Schmitz. Stahl u. Eisen, vol. 44, no. 11, Mar. 13, 1924, pp. 285-287, 2 figs. Pulverized-coal furnaces for forge shops and rolling mills at plant of Vereinigten Stahlwerken van der Zypen & Wissener Eisenhütten A.-G.; composition of fuel; refractory brick; temperature conditions; ashes and flue dust; tests on open-hearth furnace.

Foundry Use. See FOUNDRIES, Pulverized-Coal-Burning.

Hazards of. The Hazards of Pulverized-Fuel Systems, H. E. Newell and Rob. Palm. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 783-784. Principal features underlying proper installations; types of systems; driers of indirect type; safety requirements.

Heating Furnaces, Use in. Pulverized-Coal Firing in a Billet Reheating Furnace (Le chauffage au charbon pulvérisé d'un four poussant à billettes). Génie Civil, vol. 84, no. 26, June 28, 1924, pp. 621-623, 3 figs. Details of reconstructing furnace for reheating billets before rolling formerly fired with half gas; difficulties met with, and advantages of new system.

The Prospects of Pulverized-Coal-Fired Heating Furnaces in Rolling Mills (Aussichten der Staubfeuerung an Wärmeöfen in Walzwerken), H. Hochgesand. Wärme, vol. 47, nos. 12, 13, 14, 15, and 16, Mar. 21, 28, Apr. 4, 11, and 18, 1924, pp. 117-119, 128-132, 141-144, 154-157, and 166-169, 14 figs. Investigation on an ingot-heating furnace with former half-gas firing; influence of fineness of grinding and size of chamber on furnace efficiency and coal consumption; economy of pulverized-coal over half-gas firing; discussion of results.

Locomotive Firing. Pulverized Fuel for Canadian Locomotives, A. J. T. Taylor. Eng. Jl., vol. 7, no. 10, Oct. 1924, pp. 633-635, 2 figs. Review of possibilities of economy in use of fuel for railway purposes.

Pulverized Coal in Locomotives. Times Trade & Eng. Supp., vol. 15, no. 335, Dec. 6, 1924, p. 274. American and British experiments.

Malleable Furnaces. Powdered Coal in a Malleable Casting Plant, F. L. Wolf and Wm. Romanoff. Am. Foundrymen's Assn.—Preprint no. 444, for meeting Oct. 11-16, 1924, 8 pp. Applications; suitable coals; theory of pulverized coal; factors affecting its efficiency; furnace operation.

Pulverized Coal for Malleable Furnaces. Iron Age, vol. 113, no. 22, May 29, 1924, pp. 1633-1635, 5 figs. Capacity increased about 20 per cent by installation at malleable plant of Am. Radiator Co., Buffalo; equipment and advantages.

Nature, Preparation, and Use. Nature, Preparation and Use of Pulverized Coal, R. K. Meade. Rock Products, vol. 27, nos. 9, 11, 14, 16, 20, and 22, May 3, 31, July 12, Aug 9, Oct. 4, and Nov. 1, 1924, pp. 52-54, 27-29, 34-36, 42-44, 51-53, and 32-34, 53 figs. Application; earlier attempts to burn pulverized fuel; construction and method of operation of types of commercial burners. Oct. 4: Practice of burning cement and lime in rotary kilns using pulverized coal as fuel; application to rotary dryers. Nov. 1: Practice of burning pulverized coal in metallurgy; under boilers; possibilities in shaft lime-kiln firing.

Open-Hearth Furnaces. Pulverized Coal for Open-Hearth Furnaces, W. H. Fitch. Iron Age, vol. 113, no. 7, Feb. 14, 1924, pp. 521-522. Comparisons with producer gas and fuel oil; use in air and regenerative furnaces and soaking pits.

Physical Aspects. A Study of the Physical Properties of Powdered Coal of Varying Degrees of Fineness; and of the Distribution of Ash and Volatile Matter among the Fractions of Different Size, Chas. Roszak. Fuel, vol. 3, no. 5, May 1924, pp. 161-165, 7 figs. Paper read at Congrès de Chauffage Industriel in Paris, 1923. See reference to original article in Eng. Index 1923, p. 526.

Plants. Clark Thread Co. Installs Pulverized-Fuel Equipment. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 714-719, 10 figs. Typical pulverized coal installation for industrial plant; furnaces of 4270 sq. ft. Stirling boilers remodeled to burn either pulverized coal or oil; preparation plant is adjacent to point of unloading and coal is transported in pulverized form through 5-in. pipe line (placed underground) a distance of 600 ft. to boiler plant.

How to Project a Pulverized-Coal Plant (Wie projektiere ich eine Brennstaubanlage?), M. Weiss. Wärme, vol. 47, nos. 19 and 20, May 9 and 16, 1924, pp. 199-202 and 225-227, 3 figs. Discusses coal bunkers, conveyors, drying plant,

dust explosions, pulverizing, dust conveying, firing, combustion chamber, ignition, etc., and describes two modern plants.

Self-Contained Pulverized Coal Unit, C. H. Tupholme. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 800-801, 2 figs. Describes British development which crushes, separates, dries, and delivers pulverized coal to furnace. Requires no auxiliary plant except means for rotating its spindle and provision of a supply of raw coal to hopper; low first cost and compactness; permits low-grade fuels to be burned economically.

Preparation and Utilization. Commercial Considerations in the Use of Powdered Fuel, F. A. Scheffler. Nat. Engr., vol. 28, no. 11, Nov. 1924, pp. 527-532, 5 figs. Recent developments in use of pulverized coal. Design of pulverized-fuel furnaces; cost data on operation of pulverized-fuel plants; boiler efficiencies of pulverized-fuel plants; distribution systems and their installation.

Pulverized Coal: Its Preparation and Utilisation, R. Jackson. Engineer, vol. 137, no. 3555, Feb. 15, 1925, p. 179. See also Engineering, vol. 117, nos. 3038 and 3039, Mar. 21 and 28, 1924, pp. 381-383 and 415-418, 22 figs. Notes on pulverizers; pendulum mills; storage bins, feeders and burners.

The Preparation and Use of Pulverised Coal, J. W. Wardell. Colliery Engr., vol. 1, no. 3, May 1924, pp. 143-146, 1 fig. Advantages of pulverizing and plant required; crushing and drying methods; pulverizing mills; types of burners; application.

Propagation of Combustion Zone. The Propagation of a Zone of Combustion in Powdered Coal, F. S. Sinnatt and L. Slater. Fuel, vol. 3, no. 10, Oct. 1924, pp. 350-355, 4 figs. Determination of minimum temperature for combustion.

Pulverizers. A British Unit Pulverizer for Coal and Other Materials. Power Engr., vol. 19, no. 214, Jan. 1924, p. 16, 2 figs. Features of design of Vickers-Griffin self-contained coal pulverizer, which enables small users of coal to adopt powdered-fuel firing economically.

Pulverized Coal Firing and the Kofino Pulverizer (Staubfeuerung und Kofinomühle), O. Berner. Elektrische Betrieb, vol. 22, no. 13, July 10, 1924, pp. 122-125, 8 figs. Design and construction of Kofino pulverizer plant, and examples of application.

Pulverisers for Powdered Fuel Firing. Power Engr., vol. 19, nos. 218, 219, 221, 222, and 224, May, June, Aug., Sept., and Nov., 1924, pp. 184-186, 213-215, 293-295, 345-346, and 414-416, 28 figs. Describes various forms of gear suited to preparation of pulverized fuel and similar work; Sturtevant ring roll mill; outstanding features of several designs of pulverizing mills.

Pulverizers for Pulverized Coal Firing (Feuerungsmühlen für Staubfeuerung), Berner. Wärme, vol. 47, no. 36, Sept. 5, 1924, pp. 413-416, 8 figs. Advantages of pulverized-coal firing . Describes Kofino grinding mill by Krupp, and gives examples of application and results of tests.

Sheet Mills. Pulverized Coal Used as Fuel in Sheet Mills, J. Glew. Iron & Steel Engr., vol. 1, no. 10, Oct. 1924, pp. 553-554, 4 figs. It has been found that where continuous-type furnaces have been used results have been much more gratifying than when batch-type furnace is employed; methods of using pulverized coal to get best results; design of furnace.

Steam Power Plants. Pulverized Coal and Rational Steam Production (Staubkohle und rationelle Dampferzeugung), H. Esselbach. Wärme, vol. 47, no. 19, May 9, 1924, pp. 216-218. Details of English, American and French pulverized-coal-fired power centrals; advantages and efficiency of pulverized coal; future outlook.

Steam Generation with Pulverized Fuel, D. Brownlie. Can. Engr., vol. 47, no. 12, Sept. 16, 1924, pp. 343-344. Development of system of low-temperature carbonization of coal with reference to important installations in Great Britain, on Continent, and in United States; efficiencies obtained by system. Abstract of paper read before Inst. Elec. Engrs.

Systems. Pulverized-Fuel Systems, A. L. Cole. Power, vol. 59, nos. 23, 24, 25, and 26, June 3, 10, 17, and 24, 1924, pp. 900-905, 16 figs.; 940-945, 17 figs.; 985-988, 16 figs.; and 1022-1027, 26 figs. Different types of equipmentt in general use for drying, pulverizing, transporting, and burning coal in pulverized form. June 3: Types of dryers. June 10: Types of pulverizers used in unit and multiple systems. June 17: Systems used for conveying coal in pulverized form, construction and operation. June 24: Type of feeders and burners used with different systems of firing coal in pulverized form; review of earlier types; typical boiler settings designed in last four years.

Tests. Experiences with Coal Dust and Combustion of Pulverized Coal (Les expériences sur les poussières de houille et la combustion du charbon pulverisé), J. Arnoul de Grey. Chaleur & Industrie, vol. 5, no. 45, Jan. 1924, pp. 23-26, 2 figs. Calls attention to important results obtained by Taffanel and Audibert from tests carried out at Liévin and Montlucon, and discusses their application to different problems of combustion of pulverized coal, dealing with problem of burners, combustion chambers, and possibility of utilizing certain combustibles in pulverized state.

Unit System. The Unit System of Pulverized Coal, W. W. Clinedinst. Sibley Jl. Eng., vol. 38, no. 8, Nov. 1924, pp. 197-199, 2 figs. Advantages of unit system; construction and theory; steam raising; test data; maintenance and cost of operation.

Unit System for Pulverized Coal, S. C. Martin. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 471-472, 1 fig. Advantages of unit system in remodeled plants; results of tests.

Use, Development in. Development in use of Pulverized Coal, C. F. Herington. Elec. Light & Power, vol. 2, no. 5, May 1924, pp. 121-125 and 166, 6 figs. Review of development of its use in industrial furnaces, boilers, locomotives, etc.; comparisons between pulverized coal and other fuels; future possibilities.

Velocity of Particles Falling in Air. The Terminal Velocity of Particles of Powdered Coal Falling in Air or Other Viscous Fluid, J. Blizard. Franklin Inst.—Jl., vol. 197, no. 2, Feb. 1924, pp. 199-208, 1 fig. Shows how velocity is affected by size and density of particle, and density and viscosity of gaseous medium in which it falls. Terminal velocity acquired by a particle of powdered coal falling in combustion chamber of a furnace is important factor determining rate at which particle burns, for the higher the velocity the more rapidly will a fresh supply of oxygen be brought to its surface. Conclusions reached applicable to estimation of velocity with which small particles other than coal fall in fluids.

PUMICE

Italian, Production of. How Italian Pumice Is Produced, A. Y. Van Amringe. Abrasive Industry, vol. 5, no. 2, Feb. 1924, pp. 46-47, 2 figs. Is quarried on mountain sides and brought to coast for inspection and sorting; notes on preparation and manufacture for commercial purposes; care necessary in grinding.

PUMPING ENGINES

Compound. New Compound Pumping Engines of the Hamburg Water Works (Die neuen Verbund-Pumpmaschinen des Hamburger Wasserwerks), R. Schröder. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 12, Mar. 22, 1924, pp. 277-283, 12 figs. Results of public tender for delivery of piston and turbo pumping engines; describes design of accepted piston pumping engine and auxiliary boiler installation; results of tests with pump valves and determination of steam consumption of engines.

PUMPING PLANTS

Double-Unit. A Double-Unit Pumping Plant, R. James. Colliery Engr., vol. 1, no. 6, Aug. 1924, pp. 283-286, 5 figs. Describes economies effected by reorganization at Navigation Colliery, Crumlin.

Economics. Heat-Economic Control of Steam Pump Works (Die wärmewirtschaftliche Kontrolle von Dampfpumpwerken), P. Brinkhaus. Gas- u. Wasserfach, vol. 67, nos. 29 and 30, July 19 and 26, 1924, pp. 421-424 and 436-437, 7 figs. Discusses boiler operations, determination of calorific value of coal, operation of pumps, calculation of pumping and boiler plants, etc.

Electrically Driven. Electric Pumping Plant on the C. & N. W., Jos. A. Andreucetti. Ry. Elec. Engr., vol. 15, no. 10, Oct. 1924, pp. 366-367, 2 figs. Notable economies effected by substituting electric operation for steam-driven equipment.

Holland. Modern Pumping Engines in Holland, J. C. Dijshoorn. Engineering, vol. 117, no. 3040, Apr. 4, 1924, pp. 446-448, 5 figs. Describes representative installations of modern practice and considerations involved in design. (Abstract.) Paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Irrigation. An Electrically Operated Irrigation Plant, C. W. Geiger. Nat. Engr., vol. 28, no. 6, June 1924, pp. 259-261, 3 figs. Description of irrigation pumping plant of River Farms company in California; capacity 504,000,000 gal. per day; screw pumps designed to operate very efficiently at low heads and driven by synchronous motors constitute present equipment.

Irrigation Pumping Machinery (Gezira Scheme), Sudan, R. W. Allen. Engineering, vol. 117, nos. 3046 and 3047, May 16 and 23, 1924, pp. 654-656 and 685-687, 11 figs. See also Engineer, vol. 137, no. 3568, May 16, 1924, pp. 549-550, 5 figs. Object of scheme is to provide, for purpose of growing cotton, irrigation of northern portion of Gezira plain; construction details of Wad-el-Nau pumping station; drainage arrangements; suction wells and pipes; discharge pipes; labor employed on erection; trials of machinery.

Mines. Features That Should be Embodied in the Design of Plunger and Centrifugal Pumps. Coal Age, vol. 25, no. 1, Jan. 3, 1924, pp. 11-14, 3 figs. Mining Congress committee suggest standards which should govern construction of pumps in coal mines, not for gathering water but for its delivery to surface.

Pumping 2,200 Feet in a Single Lift, E. F. Irving. Eng. & Min. Jl.—Press, vol. 117, no. 26, June 28, 1924, pp. 1041-1043, 4 figs. See also Arizona Min. Jl., vol. 7, no. 19, Mar. 1, 1924, p. 9, 1 fig. Details of large and unusual installation in junction shaft of Calumet & Arizona Mining Co., Warren, Ariz.

Railway Service. Southern Pacific Completes Million Gallon Pumping Plant. Ry. Eng. & Maintenance, vol. 20, no. 3, Mar. 1924, pp. 105-107, 5 figs. Large air-life system at El Paso proves big improvement over prior arrangement.

Water-Works. A Large English Bored Well, F. J. Dixon. Eng. & Contracting (Water Works), vol. 61, no. 2, Feb. 1924, pp. 347-353, 3 figs. Sinking, lining and testing of a 1054-ft. hole in 36-in. to 20-in. diameter sections, and brief account of Somerford pumping plant, of South Staffordshire Water Works Co.

Selection of Auxiliaries for Steam-Operated Pumping Stations, F. G. Cunningham. Am. Water Wks. Assn.—Jl., vol. 11, no. 2, Mar. 1924, pp. 341-357. Methods of driving auxiliaries; comparing power requirements of auxiliaries; heat balance; condensers and condenser auxiliaries; boiler feed pumps; stoker drives; mechanical draft driving mechanism.

$60,000 Saved in One Year's Pumping By Diesel Power. Oil Engine Power, vol. 2, no. 2, Feb. 1924, pp. 103-105, 1 fig. Comparison of two pumping plants of Rond Point Water Works of Alexandria Water Co., Ltd., Egypt, one steam-driven and other Diesel-engine-driven, showing tremendous advantages of Diesel power over that of steam.

Water Works Pumping Plant at Guelph, H. S. Nicklin. Can. Engr., vol. 46, no. 9, Feb. 26, 1924, pp. 267-268, 4 figs. Describes additional pumps installed in plant at Guelph, Ont., in 1920 and 1922; motor-driven Rees Roturbo and Bawden centrifugal pumps, also Sterling engine-driven units; operating costs reduced.

Water Works Pumping Stations, C. B. Burdick. Am. Water Wks. Assn.—Jl., vol. 11, no. 2, Mar. 1924, pp. 358-380, 11 figs. Outlines general principles of pumping station design and cites a few examples of recent construction, referring more particularly to buildings for housing water works equipment.

PUMPING STATIONS

Baltimore, Md. Nine Years' Operation of the Baltimore Sewage Pumping Station, C. E. Keefer. Pub. Works, vol. 55, no. 7, July 1924, pp. 207-210, 5 figs. Description of plant and details of operation, including amount of screenings, slip and duty of pumps, and most of operation for each year from 1915 to 1923, inclusive.

Central. No Unnecessary Pipe Fittings in This Pump Station, J. H. Edwards. Coal Age, vol. 26, no. 19, Nov. 6, 1924, pp. 651-654, 7 figs. New central pump station of Keystone Coal & Coke Co., Greensburg, Pa.; single-stage centrifugal pumps are connected in series; units rated 400 hp., 4200 gal. per min., 285-ft. head; brick-lined duct connects pump house with 60-acre sump.

Cleveland, Ohio. The Fairmount Pumping Station and Heating Plant, L. A. Quayle. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 866-872, 4 figs. See also Power, vol. 60, no. 22, Nov. 25, 1924, pp. 844-847, 3 figs. Particulars of novel features incorporated in new station in Cleveland, Ohio, together with analysis of efficiency of various steam prime movers available for water-works use.

Coal Handling. See COAL HANDLING, Pumping Station.

Diesel-Engine-Driven. A Novel Diesel Pumping Plant, F. J. Dixon. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 23-24, 1 fig. Diesel-driven combination of bore-hole and force-pump, without reservoir, erected at Somerford by So. Staffordshire Waterworks Co.

Cutting Pumping Costs With Oil Engine Driven Generator, A. L. Greene. Fire & Water Eng., vol. 75, no. 5, Jan. 30, 1924, pp. 207-208 and 224-225, 5 figs. Particulars of new water works plant at Gloucester, N. J., having motorized pumps with Diesel-engine-driven generators furnishing motive power; reasons for installing motorized pumps; conditions governing use; summary of advantages gained.

Large Paris Pumping Plants are Diesel-Driven.

Oil Engine Power, vol. 2, no. 7, July 1924, pp. 388-390, 3 figs. Gives illustrations and account of one of large oil-engined pumping plants of Paris, fitted with two 4-cylinder, 4-cycle engines belt-connected to Rateau double-suction centrifugal pumps.

Operating Experiences of a Diesel Engine Pumping Station, W. De Witt Vosbury. Fire & Water Eng., vol. 75, no. 23, June 4, 1924, pp. 1215, 1219, and 1224, 4 figs. See also Am. Water Works Assn.—Jl., vol. 12, no. 4, Dec. 1924, pp. 381-390 and (discussion) 390-392, 1 fig. Statistics showing experiments in use of Diesel engine in Gloucester, N. J., station, a typical small water works pumping station.

The Somerford Pumping Station, South Staffordshire Waterworks Company, F. J. Dixon. Engineering, vol. 117, nos. 3031 and 3032, Feb. 1, and 8, 1924, pp. 155-157 and 187-189, 10 figs. See also Sulzer Bros. Technical Rev., no. 3, 1924, pp. 1-12, 9 figs. Pumping plant consists of 4-cylinder Sulzer Diesel engine, driving vertical-spindle centrifugal borehole pump; details of plant and auxiliaries. (Abstract.) Paper read before Instn. Water Engrs.

Electric Control. Electrically-Controlled Pumping Station. Engineering, vol. 118, no. 3072, Nov. 14, 1924, pp. 670-672, 8 figs. Describes Dean system of remote control for valves installed at Chester Water Works.

Electrically Driven. Illinois Central Builds Modern Pumping Station, C. R. Knowles. Ry. Age, vol. 76, no. 26, May 31, 1924, pp. 1309-1311, 3 figs. See also Ry. Eng. & Maintenance, vol. 20, no. 6, June 1924, pp. 233-236, 5 figs. Facilities at Clinton, Ill., consist of three deep wells equipped with turbine pumps and 50,000-gal.-per-hr. water softener, all of which are electrically driven, together with filters, pipe lines, and additional storage tank having capacity of 100,000 gal.

France. The Loire Pumping Station at Pertuiset [Station de pompage dans la Loire au Pertuiset (Loire)], G. J. Laferrière. Génie Civil, vol. 85, no. 17, Oct. 25, 1924, pp. 357-360, 10 figs. Details of water intake, feed pumps, reservoirs, sand filters, and main pumping plant of a station on Loire river, having capacity of 5000 cu. m. per 22 hours, for industrial purposes.

Oshkosh, Wis. Reconstruction of Oshkosh Water-Works, J. Sam Hartt. Power, vol. 60, no. 21, Nov. 18, 1924, pp. 802-803, 2 figs. Describes rebuilding of municipal pumping plant at Oshkosh, Wis.; synchronous-motor gasoline-engine pumping units replace old-time steam plant.

Sewage. See SEWAGE DISPOSAL, Pumping Stations.

Vereeniging, South Africa. Pumping Plant Installed in Connection with the Rand Water Board Vaal River Scheme, W. Ingham and C. E. Mason. S. African Instn. Engrs.—Jl., vol. 23, no. 2, Sept. 1924, pp. 232-246 and (discussion) 246-248, 14 figs. Details of pumping plant installed at Vereeniging.

PUMPS

Air. See AIR PUMPS.

Air-Lift. Experimental Study of Air Lift Pumps and Application of Results to Design, C. N. Ward and L. H. Kessler. Univ. of Wis.—Bul., vol. 9, no. 4, serial no. 1265, 1924, 166 pp. 60 figs. See also Eng. & Contracting (Water Works), vol. 61, no. 16, June 11, 1924, pp. 1273-1278, 6 figs. Results of experiments as to foot pieces show that conditions of eduction pipe, where energy of air is expended in producing motion of water, are factors determining success or failure.

Theory of the Air-Lift Pump with Special Reference to the Slip of Air Bubbles in Water, O. Miyagi. Tôhoku Imperial Univ.—Technology Reports, vol. 4, no. 2, 1924, pp. 1-18, 2 figs. Solves problem of air-lift pump with special reference to slip of air bubbles in water, and constructs formulas giving terms by which its effect on air-lift pump can be determined separately from others.

With Air Lift Flood Water Can Be Removed at a Single Inexpensive Setting of Equipment, E. J. Gealy. Coal Age, vol. 26, no. 25, Dec. 18, 1924, pp. 868-870, 4 figs. Difficult pumping problems solved in mines of Glen Alden Coal Co. by use of compressed air; three air lifts deliver 2300 gal. per min.; economy of installation and convenience of operation.

Boiler-Feed. Boiler Feed Pump Explanations and Calculations, Chas. L. Hubbard. Power, vol. 60, nos. 25 and 26, Dec. 16 and 23, 1924, pp. 979-982 and 1021-1024, 8 figs. Dec. 16: Principles underlying successful operation and how to figure capacity, suction lift or pressure of feed pump. Dec. 23: Selecting boiler feed pumps; characteristics.

Borehole. A New Borehole or Well Pump, J. A. Frerichs. S. African Min. & Eng. Jl., vol. 35, no. 1702, May 10, 1924, pp. 938-939. Describes pump designed and patented by G. E. White, White's Patent Pumps, Johannesburg; consists of 2 cylinders with buckets and ball valves, placed in tandem in an outside casing, and each of these cylinders is directly connected by separate suction passages to outside of outer casing.

"Mirrlees-Leggett" Borehole Pumps. Elec. Times, vol. 66, no. 1730, Dec. 11, 1924, pp. 707-708, 2 figs. Improved type of circulating borehole pump which, until now, has been manufactured only in India.

British Empire Exhibition. British Empire Exhibition; Pumps and Pumping Machinery. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 689-692, 17 figs.; vol. 118, nos. 3053 and 3059, July 4 and Aug. 15, 1924, pp. 2-5 and 216-220, 31 figs., partly on supp plates. May 30: Worthington-Simpson 48-in. centrifugal pump for Littleton reservoir of Met. Water Board; centrifugal pumps constructed by Pulsometer Engrg. Co.; Restler double-acting pump; etc. July 4: Describes high-lift turbine pumps, emergency bilge pump, and low-lift turbine pump for submerged working exhibited by Gwynnes Eng. Co., Ltd., Hammersmith; duplex pump with Twells valve gear, vertical piston cooling pump, and duplex steam pump, of Hayward-Tyler & Co., Ltd.; and opposed-impeller extraction pump, low-lift condensate pump, and multi-stage high-lift pump, of Mirrlees Watson Co., Ltd. Aug. 15: Describes exhibits, including motor-driven two-throw double-acting pump and 20,000-gal. turbo boiler-feed pump of G. and J. Weir, Ltd.; emergency bilge pump and 4-in. salvage pumping set of Drysdale & Co., Ltd.; Gwynne-Pennel rotary trap; and steam turbine boiler-feed pump and other pumping machinery of Gwynnes Engineering Co., Ltd.

Chemical Industry. Pumps in the Chemical Industry (Pumpen in der chemischen Industrie), F. Jaeger. Zeit. für angewandte Chemie, vol. 37, no. 45, Nov. 6, 1924, pp. 882-884. Discusses centrifugal pumps and their operation, acid-resisting lining, piston pumps and valve efficiency, diaphragm pumps, air-pressure pumps, steam-pressure pumps, etc.

Circulating, Motor-Driven. Motor-Driven Circulating Pumps, H. B. Seeley. Elec. Wld., vol. 84, no. 13, Sept. 27, 1924, pp. 689-691, 3 figs. Characteristics of circulating system, applications of various pump combinations, desirable speed requirements, and economical operation.

Condenser. See CONDENSERS, STEAM, Pumps, Cooling-Water.

Drainage. Double-inlet Drowned Drainage

Pumps. Engineer, vol. 136, no. 3550, Jan. 11, 1924, p. 52, 2 figs. Describes large drainage pumps manufactured for Renala irrigation scheme of Indian Government.

Some Large Dutch Drainage Pumps, J. C. Dijxhoorn. Engineer, vol. 137, no. 3567, May 9, 1924, pp. 506-507, 3 figs. Particulars concerning pumps which were put to work over 3 years ago near village of Zoutkamp on Lauver Zee. (Abstract.) Paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Electric Drive. See ELECTRIC DRIVE, Irrigation Pumping.

Gas. In This Gas Pump Water Acts as a Piston, F. J. Taylor. Fire & Water Eng., vol. 75, no. 20, May 14, 1924, pp. 1001, 1054, and 1056, 4 figs. An English self-contained internal-combustion gas pump, resulting energy of which is used to pump water without assistance of connecting rod, crankshaft or other parts.

See also Humphrey.

Gasoline. The "Shell" Kerbside Petrol Pump. Engineering, vol. 117, no. 3036, Mar. 7, 1924, pp. 301-304, 10 figs. Gasoline is raised from underground tank by hand-operated, semi-rotary pump and delivered into one or other of two measuring vessels, or containers, through four-way plug cock.

Humphrey. The Humphrey Gas Pump. Can. Engr., vol. 47, no. 7, Aug. 12, 1924, pp. 243-244, 2 figs. Internal-combustion engine used for pumping water; explosion of gas forces water through pipe.

Mine, Metals for. Metals Used in Mine Pumps, G. A. Drysdale. Min. Congress Jl., vol. 10, no. 1, Jan. 1924, pp. 47-49. Relative value of their resistive properties.

Oil. See OIL PUMPS.

Oil-Well. See OIL WELLS, Pumping.

Rotary. A New Rotary Pump (Neuerung im Bau von Rotationspumpen), E. Winter. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 9-10, Mar. 7, 1924, pp. 80-81, 7 figs. Describes "Feuerheerd" pump, named after its inventor. Shaft drives inner rotor, which carries three radial projections or arms, which fit into four corresponding pockets of outer rotor. Pump provides a uniform flow, is simple and reliable, and has found considerable use in England and British Colonies.

Positive Rotary Pumps for Oil-Engine Drive. Oil Engine Power, vol. 2, no. 9, Sept. 1924, pp. 480-482, 4 figs. Discusses characteristics of direct-connection to oil engines and pressures developed by them.

Selection. Comparison of Pumping Equipment, R. T. Livingston. Power Plant Eng., vol. 28, no. 16, Aug. 15, 1924, pp. 849-850. Discusses types of pumps and practical method of comparing pumping equipment.

Testing. The Comparison of Pump Tests with Special Reference to Low Head Pumps, E. F. Delery. Louisiana Eng. Soc.—Proc., vol. 10, no. 2, Apr 1924, pp. 98-107. Lays stress on capacity and spouting velocity as related to lift in selecting or designing pumps; gives practical examples of determining efficiency.

Theory of. The Theory of Pumps and Compressors (Beiträge zur Theorie von Pumpen und Kompressoren), E. Altenkirch. Zeit. für technische Physik, vol. 5, no. 2, 1924, pp. 44-52, 7 figs. Author endeavors to solve problem which frequently occurs in practice, that is, to describe working and to design pump or compressor which in given time will produce prescribed vacuum or compression in container, whose volume continuously varies through entrance or removal of liquid; author applies geometrical method of calculation based on properties of circle; gives graphs embodying results of graphical solutions; conclusions are drawn as to working of pump according to relative sizes of piston space, dead space, etc.

Vacuum. An All-Metal High-Vacuum Pump System, I. Backhurst and G. W. C. Kaye. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 281, May 1924, pp. 918-929, 3 figs. Describes pump system of two-stage type, constructed wholly of metal and consisting of (1) mercury-vapor jet pump in series with (2) mercury-vapor condensation pump; advantages of system. Bibliography. See also paper by same authors, entitled, A Metal Annular-Jet Vacuum Pump, describing modification of pump described in first paper, pp. 1016-1020, 2 figs.

Determining the Type of Vacuum Pump for Given Air Removal Conditions, C. M. Reed. Power, vol. 60, no. 2, July 8, 1924, pp. 52-54, 4 figs. Discusses rotative dry-vacuum pump and steam-jet pumps, and gives charts for simplified calculation of relative volumes and weights of dry air in air-steam mixtures.

Time Required for Exhausting Containers by Means of Rotary Vacuum Pumps on the Multiple-Cell Principle (Evakuationszeit beim Evakuieren von Behältern durch rotierende Vakuumpumpen des Vielzellenprinzips), H. Baum. Fördertechnik u. Frachtverkehr, vol. 17, no. 23, Dec. 3, 1924, pp. 327-329, 2 figs. Determination of effective suction action of rotary vacuum pumps at various vacuums, effective suction for a given vacuum being known.

Water Elevators. See WATER ELEVATORS.

PUMPS, CENTRIFUGAL

Boiler-Feed. Sulzer Turbo Boiler Feed Pumps. Sulzer Tech. Rev., no. 1, 1924, pp. 3-7; 4 figs. Advantage of steam-turbine drive; types of turbines used for drive; how turbo boiler-feed pumps are governed.

British Empire Exhibition. See PUMPS, British Empire Exhibition.

Calculation. The Calculation of Centrifugal Pumps (Die Berechnung von Kreiselpumpen), H. G. Bader. Zeit. des Vereines deutscher Ingenieure, vol. 44, no. 68, Nov. 1, 1924, pp. 1145-1149, 9 figs. Theory of the confined vortex, which has been found useful in calculation of airfoils, can be successfully applied to systematic design of centrifugal pumps; the faulty basic equation for calculation of pressure head is replaced by an equation which not only avoids considerable deviation from measured values, but also gives excellent reproduction of characteristic curve.

Characteristic Curves. Centrifugal Pump Characteristic Curves, W. E. W. Millington. World Power, vol. 2, no. 8, Aug. 1924, pp. 103-107, 10 figs. Indicates a method of analysis of pump characteristic curves which, in author's opinion, is much more valuable in actual practice than usual method of employing equations which have proved to be most treacherous in actual use.

Use of Centrifugal Pump Curves. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 497-499, 2 figs. Usual forms of characteristic curves for centrifugal pumps based on constant speed.

Characteristics, Calculation of. Figuring Centrifugal Pump Characteristics from Those at Known Speed, F. C. Evans. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 487-488, 2 figs. Three laws of centrifugal pump operation on which are based calculations to predict variable speed characteristics.

Deep-Suction. Modern Centrifugal Pumps With Electric Drive for Deep Suction (Neuartige Tiefsauge-Motor-Kreiselpumpen), C. Redzich. Gesundheits-Ingenieur, vol. 47, no. 36, Sept. 6, 1924, pp. 397-400, 9 figs. Details of pumping plants

which are practically independent of depth of groundwater and are of very high capacity, especially mine pumps.

Developments. Modern Centrifugal Pump Practice. Indian & East. Engr., vol. 55, nos. 2, 3, and 4, Aug., Sept., and Oct. 1924, pp. 67-68, 111-114, and 155-160a, 22 figs. Notes on recent improvements in design, various types for a variety of duties, and outline of notable installations.

Electric vs. Steam Drive. Electric Motors for Driving Centrifugal Water Pumps, E. G. Sohlberg. Chem. & Met. Eng., vol. 30, no. 21, May 26, 1924, pp. 832-833, 3 figs. Comparison of cost of pumping water by this method, using central-station current, with steam turbine and engine drives.

Fire. Fire Pumps (Motorwagen-Feuerlöschpumpen). Zeit. des Vereines deutscher Ingenieure, vol. 44, no. 68, Nov. 1, 1924, pp. 1153-1154, 5 figs. Advantages of centrifugal over piston pumps; equipment of motor fire engine; description of Sulzer adjustable centrifugal pumps.

Flow Phenomena in. Experimental Investigation of Flow of Water through a Turbine Acting as Centrifugal Pump (Experimentelle Untersuchung der Wasserströmung durch ein rotierendes Zellen-Kreiselrad), H. Oertli. Schweizerische Bauzeitung, vol. 83, no. 20, May 17, 1924, pp. 231-234, 13 figs. Results of tests to investigate flow phenomena in rotary water wheel.

High-Lift. Centrifugal Pumps at the British Empire Exhibition. Engineering, vol. 118, no. 3070, Oct. 31, 1924, pp. 625-627, 10 figs. High-lift turbine pumps exhibited by Brit. Elec. Plant Co.

The Construction and Operation of Centrifugal Pumps. Gas Engr., vol. 40, no. 584, Dec. 1924, pp. 265-266, 2 figs. Briefly enumerates advantages of central pump, and describes action of a pump of this type as at present designed for high lifts, which is becoming increasingly popular for gas works purposes.

Internal Leakage. Determination of Internal Leakage in Centrifugal Pumps, A. F. Sherzer. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1056-1058, 5 figs. Facts regarding coefficient of discharge established by research in hydraulic laboratory of Univ. of Mich.

Lubrication. Oil System Specially Designed for Municipal Pumping Plant, H. R. Cady. Power, vol. 60, no. 6, Aug. 5, 1924, pp. 203-205, 3 figs. Tells why continuity of service is highly important and how low renewal cost is obtained. Gravity tank provides 15-min. supply without pump, and indicating devices check operation.

Mine Service. Some Advantages of the Centrifugal Pump for Mine Service, W. A. Cather. Coal Mine Mgmt., vol. 3, nos. 10 and 11, Oct. and Nov. 1924, pp. 38-42 and 28-31, 5 figs. Oct.: Proper field for centrifugals; low first cost; space advantages; lower piping costs. Nov.: Operating costs; attendance; maintenance.

Operation. The Operation of Centrifugal Pumps, J. S. Pillans. Engineer, vol. 138, no. 3600, Dec. 26, 1924, pp. 732-733, 3 figs. Deals with low-lift and turbine pumps.

Semi-Portable. See AIR COMPRESSORS, Semi-Portable.

Specifications. Notes on Centrifugal Pump Specifications, J. D. Morgan. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 555-559, 7 figs. Service requirements are principal data needed by designer; service records show dependability of centrifugal pumps.

Suction Pipes, Evacuating. Evacuating the Suction Pipes of Centrifugal Pumps, W. S. Douglas. Power Engr., vol. 19, no. 219, June 1924, pp. 205-207, 4 figs. Study of conditions obtaining during process; develops formulas for predetermination of pump capacities, etc., for given plants.

Sulzer. Reclamation Pumping Stations Equipped with Sulzer Centrifugal Pumps. Sulzer Tech. Rev., no. 4, 1924, pp. 7-14, 18 figs. Describes types of pumps installed in Swiss pumping stations.

Testing. Testing of Centrifugal Pumps (Prüfung von Kreiselpumpen). Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1127-1128, 3 figs. Necessity for verification of calculation of centrifugal pumps due to hydraulic losses which cannot be determined exactly; arrangement of testing station; measurement of pressure and power consumption; etc.

Turbine. Turbine Pump for Boiler Feeding, C. H. S. Tupholme. Power Plant Eng., vol. 28, no. 5, Mar. 1, 1924, pp. 279-280, 4 figs. Recent installations in Great Britain indicate growing use of turbine pump.

Turbo-Pumps, R. James. Colliery Engr., vol. 1, nos. 3 and 4, May and June 1924, pp. 113-115 and 196-198, 15 figs. Review of principles and practice of turbine pump as applied to conditions of colliery work.

See also Boiler-Feed.

Turbine-Driven. A Steam Turbine Waterworks Set. Power Engr., vol. 19, no. 214, Jan. 1924, pp. 17-19, 2 figs. Describes plant erected to meet special circumstances at Oakfield Road pumping station, Clifton.

Port of London Authority Rotary Hydraulic Pumping Plant. Power Engr., vol. 19, no. 223, Oct. 1924, pp. 378-382, 6 figs. Describes two turbine pumping plants for furnishing high-pressure water at London docks.

PUNCHES

Dies and, Standard Sets. Standard Punch and Die Sets, S. Diamant. Am. Mach., vol. 61, no. 5, July 31, 1924, pp. 199-201, 3 figs. Various types and advantages. Time and original cost saved by standard equipment. Abstract of paper for Metropolitan Sec. A.S.M.E., Apr. 15, 1924.

PYRITES

Chalcopyrite. Roasting of Chalcopyrite (Ueber die Vorgänge bei der Röstung von Chalkopyrit), V. Tafel and E. Greulich. Metall u. Erz, vol. 21, no. 22, 2nd Nov. no., 1924, pp. 517-520, 2 figs. Analytical results of lye tests with products from roasting chalcopyrite in dry air current at temperatures between 300 and 700 deg. Formation of $CuSo_4$, $FeSo_4$, $Fe_2(SO_4)_3$, etc.

Germany. Pyrites and Sulphur (Schwefelkies, Schwefel und seine Bedeutung). Bergbau, vol. 37, nos. 23 and 24, Oct. 23 and 30, 1924, pp. 620-622 and 638-642. Occurrence of pyrites at Meggen, on Lenne river, and at Goslar, in Harz mountains; analysis of minerals and geological data. Pyritic smelting furnace.

Roasting. The Hydrogen Roasting of Pyritic Ores With Recovery of Sulphur and Iron, H. Conder. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 286-296. Discusses new process in which hydrogen is produced by electrolysis of solution carrying hydrochloric acid and ferrous chloride, yielding ferric chloride, hydrogen being passed over pyritic ores, yielding sulphurated hydrogen.

Servia. Pyrites at Maidan-Peck, Servia (Les pyrites de Maidan-Peck, Serbie), J. Barthoux. Académie des Sciences—Comptes Rendus, vol. 179, no. 19, Nov. 10, 1924, pp. 982-984. Discusses Maidan-Peck deposit along Danube, formerly worked for copper and now being worked for iron pyrites.

Spontaneous Combustion Caused by. Pyrites

as a Cause of Spontaneous Combustion in Coal Mines, J. Ivon Graham. Colliery Guardian, vol. 127, no. 3298, Mar. 14, 1924, pp. 671-672 (includes discussion). Results of researches; shows that any form of pyrites in a finely divided condition will absorb oxygen rapidly from air with consequent heat production, and that heatings due to oxidation of pyrites will probably develop more rapidly than those caused by oxidation of coal. From paper read before South Staffordshire and Warwickshire Inst. Min. Engrs.

Sulphur and Moisture Determination. Methods for the Determination of Sulphur and Moisture in Pyrites Ores. Analyst, vol. 49, no. 584, Nov. 1924, pp. 528-531. As approved by Swedish Govt. Testing Inst. and by Norwegian Govt. Analysis Committee.

PYROMETERS

Classification and Application. Classification and Application of Pyrometers, R. W. Newcomb. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 7, Oct. 1924, pp. 249-267 and (discussion) 268-280, 5 figs. Deals with types and their suitability, construction, and serviceability.

Disappearing-Filament. A Direct-Reading Pyrometer of the Disappearing-Filament Type, F. H. Schofield and D. C. Gall. Jl. Sci. Instruments, vol. 1, no. 7, Apr. 1924, pp. 193-198, 5 figs. Modified form of disappearing-filament pyrometer in which pyrometer lamp forms one arm of a Wheatstone bridge.

Glass Furnaces. The Use of Pyrometers in the Glass Industry. Soc. Glass Technology—Jl., vol. 8, no. 30, June 1924, pp. 94-150. Series of articles on: Use of Pyrometers in Glass Industry, E. A. Goad-Pryor, 94-105; Continuous High Temperature Measurement in Glass Works, W. M. Clark, 105-109; Practical Applications of Pyrometers to Glass Works, C. E. Foster, 109-116; Some Reflections on Pyrometer Design and Description of New Radiation Pyrometer, 117-123, 3 figs.; Recent Advances in Design of Temperature Measuring Instruments, 124-138, 11 figs.; Thermal Endurance of Glass, V. H. Stott and E. Irvine, 139-150, 1 fig.

Immersion. See METALS, Melting-Temperature Determination.

Micro. See METALS, Radiation Measurement.

Optical. An Optical Pyrometer. Metal Industry (Lond.), vol. 25, no. 14, Oct. 3, 1924, pp. 329-330, 2 figs. Construction and technical features of "Pyro" pyrometer.

Optical Temperature Measurement in Practice (Optische Temperaturmessung in der Praxis), A. Fry. Stahl u. Eisen, vol. 44, no. 45, Nov. 6, 1924, pp. 1398-1405, 6 figs. See also Kruppsche Monatshefte, vol. 5, Oct. 1924, pp. 193-201, 6 figs. Discusses optical pyrometers and pyrometry; correction factors, test measurements, practical measurements with a Halborn-Kurlbaum Pyrometer.

The Optical Pyrometer as a Brightness Photometer, W. E. Forsythe. Franklin Inst.—Jl., vol. 197, no. 4, Apr. 1924, pp. 517-525, 4 figs. Disappearing filament pyrometer, with red-green glass in eyepiece, has been found very satisfactory as photometer for measuring brightness of different surfaces that were difficult to measure by ordinary means.

Radiation. Determination of High Temperatures (Die Bestimmung hoher Temperaturen), F. Henning. Zeit. für Elektrochemie, vol. 30, no. 7, July 1924, pp. 309-318, 2 figs. Discusses temperature measurement by radiation pyrometers, bases of optic pyrometry, black temperature, micropyrometers, etc.

The "Pyro" Radiation Pyrometer. Engineering, vol. 117, no. 3042, Apr. 18, 1924, pp. 493-494, 6 figs. It is easily portable, weighing only 25 oz., and is completely self-contained, requiring no batteries or other accessory apparatus.

Uses. Modern Temperature-Measuring Apparatus (Die modernen Temperaturmessgeräte), F. Knoops. Metall u. Erz, vol. 21, no. 12, June 2, 1924, pp. 270-272. Discusses various groups of pyrometers, their field of application, advantages and drawbacks, errors in measuring, etc.

PYROMETRY

Fundamental Principles. Non-Technical Discussion on Pyrometry, G. C. McCormick. Forging—Stamping—Heat Treating, vol. 10, nos. 1 and 2, Jan. and Feb. 1924, pp. 38-39 and 72-74. Fundamental principles reduced to terms within understanding of layman; frequent checking of couples and instruments essential.

Steel-Works. General Phases of Pyrometry and Temperature Control in the Steel Industry, O. Brewer. Iron & Steel Engr., vol. 1, no. 3, Mar. 1924, pp. 116-123 and (discussion) 123-127, 8 figs. Deals with instruments for indicating, recording and controlling temperatures, and their application to blast furnace, open hearth, soaking pits, rolling mill, etc.

Thermoelectric. The Principles of Applications of Thermoelectric Pyrometry, L. B. Haney. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 185-206, 7 figs. Discusses developments, thermocouples, precious metal, base-metal, cold end of couples, protection and repairs of couples; methods of standardization of couples and instruments, etc.

PYROXYLIN

Lacquers. See NITROCELLULOSE, Lacquers.

Q

QUANTA

Mechanics. Quantum Mechanics (Ueber Quantenmechanik), M. Born. Zeit. für Physik, vol. 26, no. 6, Aug. 20, 1924, pp. 379-395. Investigation which seeks to establish first step in quantum mechanics, as to which of main characteristics of atom (stability, resonance, fulfillment of correspondence principle, etc.) furnishes adequate basis for calculation and originates from classical laws in natural manner; theory includes dispersion formula of Kramer and shows close relationship to Heisenberg's formulas for rules concerning anomalous Zeeman effect; mathematical discussion of classical theory for disturbance of system exposed to external forces, classical dispersion theory, and review of quantum theory in relation to same problem.

Theory. Contributions to the Interpretation of the Quantum Theory (Beiträge zur Deutung der Quantentheorie), R. Mecke. Zeit. für Physik, vol. 21, no. 1, Jan. 24, 1924, pp. 26-37. The usual three-dimensional conception of the mass atom is extended to its four-dimensional analogue, the effective quantum.

The Quantum Theory, E. P. Adams. Nat. Research Council—Bul., vol. 7, part 3, no. 39, Nov. 1923, 109 pp. General dynamical theory; hypotheses of quantum theory; specific heat of solids;

quantum theory and kinetic theory of gases; spectral lines; photoelectric phenomena; quantum theory and magnetism.

QUARRIES

Electric Locomotives for. See ELECTRIC LOCOMOTIVES, Pit and Quarry Haulage.

Electric Railway System for, Centrally-Controlled. The Operation of a Centrally-Controlled Electric Quarry Railway System. Rock Products, vol. 27, no. 17, Aug. 23, 1924, pp. 47-49, 8 figs. Discusses advantages of centrally-controlled electric haulage system in use at one of Marble Cliff Quarries Co.'s quarries, near Columbus, Ohio.

Property Exploration and Examination. Exploration and Geological Examination of a Quarry Property and Their Relation to Financing, D. B. Rush. Rock Products, vol. 27, no. 5, Mar. 8, 1924, pp. 56-59, 3 figs. Suggestions for anyone desiring to operate or open a quarry property.

Safety Code for. New Special Rules for Quarries. Colliery Guardian, vol. 128, no. 3329, Oct. 17, 1924, pp. 1001-1002, 3 figs. Revised code of rules issued by (Brit.) Mines Dept. relating to safety of quarry, use of explosives, means of access, machinery and plant, first aid and ambulance arrangements; other duties of owner and officials and of persons employed.

QUARRYING

Blasting. See BLASTING, Quarry.

Boreholes. See BOREHOLES.

Drilling and Blasting. Some Fundamentals of Big Blast Hole Drilling, M. B. Garber. Eng. Wld., vol. 24, no. 4, Apr. 1924, pp. 228-232. See also Concrete, vol. 24, no. 3, Mar. 1924, pp. 37-40. Suggestions on quarrying drilling, including importance of properly balanced tool, factor of weight in drilling tools, care of drilling tool taper joints, shape of drill bits, welded versus all-steel drill bits, seams, crevices and crooked holes, etc.

Symposium: Drilling and Blasting. Rock Products, vol. 27, no. 5, Mar. 8, 1924. Contains following papers: Some Fundamentals of Big Blast Hole Drilling for Quarry Work, M. B. Garber, pp. 87-91; Standardization of Drill Joints and Properly Balanced Tools, F. A. Gill, pp. 91-92; Hercoblasting, J. Barab, pp. 93-94, 3 figs.; Blasting Data—Costs and Efficiency, S. R. Russell, pp. 95-96.

Granite. Granite Quarrying in Wisconsin, W. Wiske. Explosives Engr., vol. 2, no. 11, Nov. 1924, pp. 379-382, 6 figs. Blasting and quarrying methods of Wisconsin Granite Co.

Mining and. Mining and Quarrying Compared by an Engineer Familiar with Both Operations, J. R. Thoenen. Rock Products, vol. 27, nos. 8, 10, 13, 16, 18, 20, 23, and 25, Apr. 19, May 17, June 28, Aug. 9, Sept. 6, Oct. 4, Nov. 15, and Dec. 13, 1924, pp. 27-29, 35-36, 35-38, 52-56, 47-49, 41-43, 52-53, and 18-19, 39 figs. Brief historical sketch; some differences in professions of quarryman and miner; where mining may be substituted for quarrying; terms used in mining translated into quarry language; various methods of removing rock; mining methods used in quarrying limestone and their application to various local conditions; some typical limestone mining operations; mining limestone with dip of 60 deg. from horizontal. Oct. 4: Typical limestone mining operations in Central Pennsylvana. Nov. 15: Typical limestone mining operations. Dec. 13: Typical gypsum mining operation.

QUARTZ

Density. The Effect of Prolonged Grinding on the Density of Quartz, A. J. Dale. Ceramic Soc. —Trans., vol. 23, part 3, 1923-24, pp. 211-216, 2 figs. Particulars of investigation carried out, an accessory aim of which was to test validity of conclusions of Ray and of Washburn and Navias, when possible contamination during grinding is taken into account. Reprinted by permission Brit. Refractories Research Assn., from Bul. no. 5, Dec. 1923.

Fused. Clear Fused Quartz, E. R. Berry. Chem. & Met. Eng., vol. 30, no. 18, May 5, 1924, pp. 715-717, 3 figs. New electric-furnace process makes possible production of this material in large pieces of excellent quality.

Clear Fused Quartz. Illuminating Eng. Soc.—Trans., vol. 19, no. 6, July 1924, pp. 568-574, 4 figs. See also Chem. Age (N. Y.), vol. 32, no. 7, July 1924, pp. 310-311, 4 figs. Discusses physical properties, application in microscopes, thermometers, therapeutics, astronomy, and photography.

Clear Fused Quartz Made in the Electric Furnace, E. R. Berry. Tech. Eng. News, vol. 5, no. 4, Nov. 1924, pp. 142-143 and 152, 3 figs. Results of development of clear fused quartz, and some of its surprising properties.

Electric Fusion of Quartz by the Vacuum Compression Process (Das elektrische Schmelzen von Quarz nach dem Vakuum-Kompressionsverfahren), H. Helberger. Zeit. für Elektrochemie u. Angewandte Physikalische Chemie, vol. 30, no. 9, Sept. 1924, pp. 435-440, 8 figs. See also Zeit. für Technische Physik, vol. 5, no. 10, 1924, pp. 476-481, 8 figs. Design and operation of Helberger furnace and its development since 1913. Properties and uses of fused quartz.

Wide Field for Quartz Opened by Fusing Process. Cement, Mill & Quarry, vol. 24, no. 9, May 5, 1924, pp. 33-36, 4 figs. See also Eng. Wld., vol. 24, no. 6, June 1924, pp. 365-368, 4 figs. Clear fused quartz can be produced on a commercial basis, in sizes and quantities heretofore impossible of achievement. The large variety of uses made possible by new process.

QUAY WALLS

Berlin. Supporting and Quay Wall at the South Bank of the Spandau Ship Canal in Berlin (Die Stütz- und Ufermauern am Südufer des Spandauer Schiffahrtkanals in Berlin), A. Schroeter. Bauingenieur, vol. 5, no. 14, July 31, 1924, pp. 423-427, 5 figs. Details of competitive designs, and construction of foundations and walls, reinforcing work, etc.

Calculation. Calculation of Quay Walls (Calcul des murs de quai), G. Sainflou. Génie Civil, vol. 85, no. 19, Nov. 8, 1924, pp. 419-424, 9 figs. Discusses under-pressure in joints of masonry. Real and fictitious joints, and two methods of calculation.

Construction. Compression and Tensile Strength Tests of Reinforced-Concrete Piles for Quay Wall Construction (Druck- und Zugversuche an Eisenbetonpfählen für Hafenkaibauten), H. Butzer. Bauingenieur, vol. 5, no. 13, July 15, 1924, pp. 401-408, 7 figs. Describes tests with piles 16-18 m. in length for new quay walls in Holland.

Reinforced-Concrete. Quay Wall at Fulham. Concrete & Constructional Eng., vol. 19, no. 8, Aug. 1924, pp. 512-514, 2 figs. Describes quay wall in use at Lensbury Fuel Oil Establishment of Shell-Mex, Ltd., England; heavy surcharge is imposed on quay wall by stacks of oil barrels, wharf being used for storage and for discharging fuel oil into oil barges.

QUAYS

Deep-Water. Effect of Deep Water Quays on Navigation, E. Latham. Engineer, vol. 137, no. 3571, June 6, 1924, pp. 625-626. Points to bear in mind from navigation point of view, with special reference to Thames estuary.

Equipment. Equipment of Seaport Quays

(L'aménagement des quais des ports de mers). P. Caufourier. Génie Civil, vol. 84, no. 6, Feb. 9, 1924, pp. 134-135, 23 figs. Discusses quayside equipment, including fixed railings, bollards, moorings, ladders, fendering and capstans; refers to article on this subject by E. Latham, published in Engineering, Oct. 5, 1923, and draws comparison between English and French practice.

Tidal Basin, Havre, France. The Extension of the Port of Havre (Les travaux d'aggrandissement du port du Havre), Ch. Dantin. Génie Civil, vol. 84, nos. 16 and 17, Apr. 19 and 26, 1924, pp. 369-374 and 393-399, 17 figs. partly on supp. plate. Tidal basin and Joannès-Couvert quay, and its construction; large drydock and surrounding works.

QUICKSILVER. See MERCURY.

R

RACE TRACKS

Automobile. Automobile Race Track at Miramas [L'autodrome de Miramas (Bouches-du-Rhone)], A. Cochet. Génie Civil, vol. 85, no. 2, July 12, 1924, pp. 29-34, 11 figs. Layout of track, details of construction, concrete track, profile of track, grand stand, etc.; length, 5000 m.

RADIATION

Black Bodies. Determination of the Constant ς of the Stefan-Boltzmann Law (Bestimmung der Konstanten σ des Stefan-Boltzmannschen Gesetzes), A. Kussmann. Zeit. für Physik, vol. 25, no. 1, June 24, 1924, pp. 58-82, 5 figs. Full and detailed account of author's 153 determinations of value of σ. Paper is divided into following sections: (1) historical sketch of methods; (2) arrangement of experiment; (3) preliminary experiments to ensure absence of systematic errors; (4) measurements and results; (5) corrections; (6) limits of error. Method employed is that of electrical compensation, which consists in having suitable black-body radiator which sends radiation through aperture of known size to receiving disk of metal of known size, temperature attained by disk being indicated by radiomicrometer.

Combustible Gases. See GASES, Radiation from.

Formula for. See HEATING AND VENTILATION, Radiation, Standard Formula for.

Heat. See HEAT, Radiation.

Soft, Production of. Methods of Production of Radiations Intermediate between Ultraviolet and X-Rays (Sur un nouveau mode de production des radiations comprises entre l'ultraviolet et les rayons X), G. Reboul and Bodin. Académie des Sciences—Comptes Rendus, vol. 179, no. 1, July 7, 1924, pp. 37-39. Results of experiments investigating large variety of chemical conductors, pulverized and pressed into tablet form, chiefly compounds of mercury, copper, iron, and tin; results are given in tabular form, indicating voltage necessary to produce radiation and intensity of latter in arbitrary units.

Study of. Radiation, W. P. Davey. Franklin Inst.—Jl., vol. 197, nos. 4 and 5, Apr. and May, 1924, pp. 439-478 and 629-666, 11 figs. Nature of atoms of material substances; effect of material substances in path of radiation; discusses Silberstein's "dart" theory, which is said to be consistent with all known experimental facts, except that of diffraction from Fresnel mirrors or from bi-prism. Bibliography.

RADIATORS

Airplane-Engine. See AIRPLANE ENGINES, Radiators.

Ammonia, Heat Transfer in Cast-Iron. Heat Transfer in Cast-Iron Radiator Sections for Ammonia, H. J. Macintyre. Ice & Refrigeration, vol. 67, no. 1, July 1924, pp. 42-43, 4 figs. Results of tests showing that cast iron may be made suitable for use on low-pressure side of ammonia cycle.

Automobile-Engine. See AUTOMOBILE ENGINES, Radiators.

Brass and Copper. See HEATING, STEAM, Unit Heaters.

Heat Emission and Costs. Comparative Costs and Heat Emission for Cast-Iron Direct Radiation, T. W. Reynolds. Heating & Vent. Mag., vol. 21, no. 10, Oct. 1924, pp. 41-45 and 57, 7 figs. With detailed data for eight different radiator heights and wall and window radiators.

The Investigation of Heat Emission from Radiators (Die Untersuchung der Wärmeabgabe von Radiatoren), E. Schmidt and A. Grossmann. Gesundheits-Ingenieur, vol. 47, no. 15, Apr. 12, 1924, pp. 121-123, 2 figs. New experimental arrangement for measurement of heat emission, and desiderata for measurement of heat-transmission coefficients of heaters.

Heat Output Control. Control of Heat Output from One-Pipe Radiators, S. H. Woodbridge. Heat. & Vent. Mag., vol. 21, no. 8, Aug. 1924, pp. 44-45, 1 fig. Details of method for fixing ratio of steam-filled space within radiator to air-filled space.

Sizes, Calculation of. A Speedy and Accurate Method of Figuring Radiator Sizes, P. R. Babcock. Heat. & Vent. Mag., vol. 21, no. 7, July 1924, pp. 53-54, 2 figs. Gives formulas and methods.

Traps. Operating Characteristics of Radiator Traps. Heat. & Vent. Mag., vol. 21, no. 4, Apr. 1924, pp. 57-60, 4 figs. What heating industry should expect of these devices in way of performancy. Symposium based upon recent tests conducted by Nat. Assn. Bldg. Owners and Mgrs.

RADIO COMMUNICATION

[See also RADIOTELEGRAPHY, RADIOTELEPHONY.]

Apparatus Manufacture. The Manufacture of Wireless Components. Eng. Production, vol. 7, no. 137, Feb. 1924, pp. 36-40, 33 figs. Describes tools and processes involved in their production.

Atmospherics. The Energy of Atmospherics, T. L. Eckersley. Electrician, vol. 93, no. 2412, Aug. 8, 1924, pp. 150-151 and 155, 2 figs. Discusses electric disturbances produced in receiving aerials, stray waves, etc., and their mathematical treatment.

Crystal Oscillation. The Crystodyne Principle. Radio News, vol. 6, no. 3, Sept. 1924, pp. 294-295 and 431, 5 figs. Details of Lossev's oscillating crystals and their application as substitute for vacuum tubes, leading to considerable simplification. Editorial, p. 292.

Mines. See MINES, Communication in.

Problems. Radioelectric Communications (L'évolution des communications radio-électriques), H. de Bellescize. Technique Modern, vol. 16, no. 8, Apr. 15, 1924, pp. 277-284, 3 figs. Notes on electromotive energy exerted by signals on receiving antenna and utilization of this electromotive energy; improvements of resonance methods and

their influence on evolution of technique; evolution of wavelengths.

Signal Measuring. A Method of Measuring Radio Field Intensities and Atmopsheric Disturbances, L. W. Austin and E. B. Judson. Inst. Radio Engrs.—Proc., vol. 12, no. 5, Oct. 1924, pp. 521-532, 7 figs. Method of measuring radio signals which depends on determination of equality of sound intensities in telephones from signal and from known alternating current preferably giving same tone; measured local current is taken from 1000-cycle tuning-fork oscillator and electromotive force impressed no telephones is controlled by voltage divider.

Survey of. Survey of the Field of Radio Communication, A. Gibbs. New Zealand Jl. Sci. & Technology, vol. 7, no. 2, July 1924, pp. 65-78. Forms of transmission, reception of electric waves, radiotelephone broadcasting, amateur stations, irregularities in medium, long-distance radiotelegraphic communication, New Zealand in relation to high-power development, and direction finding.

Underground Signaling. See MINE SIGNALING, Underground Radio Signaling.

RADIOACTIVITY

Heat from Radioactive Substances. Apparatus for Measuring the Heat Produced by Radioactive Substances (Sur un appareil à mésurer la chaleur dégagée par les corps radioactifs), D. Yovanovitch. Académie des Sciences—Comptes Rendus, vol. 179, no. 3, July 21, 1924, pp. 163-165, 1 fig. Two identical Dèwar flasks are placed in cylindrical cavities in block of iron, and cavities are filled with mercury and covered up; substance to be examined is placed in one of flasks, and in other is coil which can be heated by electric current; this is adjusted until temperature in two flasks remains permanently equal, as shown by a thermopile.

Theory. A Part-Theory of Radioactivity, F. H. Loring. Chem. News, vol. 128, no. 3333, Feb. 22, 1924, pp. 113-115. Following up the idea that radiation at its inception can encircle a positive nuclear part is in effect eliminated, or single electrons driven away from their binding nuclei by a blow directed from core of atom, electrons which are bound up with circular radiation, and produce it by their vibration, are dragged out of atomic system by attached radiation which sets off at a velocity characteristic of radiation.

RADIOGONIOMETERS. See DIRECTION FINDING, Radiogoniometer for.

RADIOMETERS

Improved Nichols. Improved Radiometer Construction, J. D. Tear. Physical Rev., vol. 23, no. 5, May 1924, pp. 641-648, 3 figs. Construction of more sensitive Nichols radiometer.

Theory. The Radiometer (Zur Theorie der Radiometerkräfte), A. Einstein. Zeit. für Physik, vol. 27, no. 1, Aug. 28, 1924, pp. 1-6. Calculation of forces based on schematic assumptions of mechanism of molecular movement in gases.

The Theory of the Radiometer (Zur Theorie des Radiometers), G. Hettner. Zeit. für Physik, vol. 27, no. 1, Aug. 28, 1924, pp. 12-22, 6 figs. When along surface of contact between gas and solid there is a temperature gradient, gas flows from regions of lower to regions of higher temperature; this thermal slip was predicted by Maxwell and independently deduced and verified by Knudsen; consequences of this slip serve to explain large group of radiometer phenomena.

RADIOTELEGRAPHY

Aerials. Receiving Aerials of Low Resistance, N. W. McLachlan. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 623-628, 3 figs. Deals with effect of ohmic resistance of antenna systems on reception.

Amplifiers. Amplification of Short Waves (Ueber die Verstärkung kurzer Wellen), H. Riegger and F. Trendelenburg. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 495-500, 11 figs. Discusses measurements of degree of amplification in high-frequency amplifiers within range of $\lambda =$ 1000 m and $\lambda = 70$ m.

Antennas. Grounding of Antennas and Diminishing of Ground Losses (Die Erdungsfrage bei Antennen und die Verminderung der Erdverluste), Hamm. Elektrotechnische Zeit., vol. 45, no. 48, Nov. 27, 1924, pp. 1309-1312, 10 figs. Discusses methods for changing ground losses, application of multiple grounds and their effect, etc. Discusses as examples St. Assise and Nauen.

Atmospherics. Atmospherics in Radiotelegraphy (Les "atmosphériques" de la T. S. F.), R. Bureau. Nature, no. 2640, Nov. 8, 1924, pp. 301-303. Discusses relation between atmospherics and meteorologic disturbances and shows that meteorology and radiotelegraphy can serve each other successfully.

Recording Atmospheric Troubles by Vibration of Antennas (L'annonce des troubles atmosphériques par la vibration des conducteurs aériens), A. Nodon. Electricien, vol. 55, no. 1341, Feb. 1, 1924, pp. 49-51. Author describes interesting observations made by him during summer of 1923 of humming and buzzing in aerials, and gives theoretical solutions of causes.

Relation Between Certain Atmospherics and Meteorologic Phenomena (Relations entre certains atmosphériques et les phénomènes météorologiques), R. Bureau. Onde Electrique, vol. 3, no. 32, Aug. 1924, pp. 385-401, 8 figs. Meteorological phenomena to which atmospherics may be due; influence of mountains, etc.

Condensers. See CONDENSERS, ELECTRIC, Radiotelegraphic.

Development, History of. How Some Problems in Radio Have Been Solved, E. F. W. Alexanderson. Gen. Elec. Rev., vol. 27, no. 6, June 1924, pp. 373-379, 9 figs. Discusses efficiency and cost of radiation; wave propagation, absorption, and fading; atmospheric disturbances; and speed of commercial signalling.

The Development of Wireless Telegraphy, A. Fürst. Eng. Progress, vol. 4, no. 12, Dec. 1923, pp. 245-249, 9 figs. Traces development step by step from first Marconi demonstrations, making brief mention of most important discoveries and inventions which have influenced present development.

Differential Equations. Wireless Telegraph Theory, A. A. Robb. Electrician, vol. 92, no. 2386, Feb. 8, 1924, pp. 158-159, 5 figs. Graphical treatment of certain differential equations.

Direction Finding. See DIRECTION FINDING.

Electron Tubes. See ELECTRON TUBES, Calculation.

Equipment for Yacht. The Radio Equipment of the Steam Yacht "Elettra," E. A. Payne. Inst. Radio Engrs.—Proc., vol. 12, no. 1, Feb. 1924, pp. 9-27, 15 figs. Describes continuous wave telegraph, telephone, and main and emergency spark transmitters, and receivers and radio goniometer of yacht.

Field and Wave Deflection. Fluctuation of Strength of Field and Wave Deflection (Feldstärkeschwankungen und Wellenablenkung), S. Wiedenhoff. Elektrische Nachrichten-Technik, vol. 1, no. 3, Aug. 1924, pp. 64-67, 4 figs. Details of measurement of receiving intensities from European radio stations, fluctuations due to atmospheric phenomena, and lower intensity during daytime due to diffusion or deflection.

Fog Signals. Radio Fog Signals for the Pro-

tection of Navigation; Recent Progress, G. R. Putnam. Nat. Acad. Sciences—Proc., vol. 10, no. 6, June 1924, pp. 211-218. Describes uses, radio fog signal stations, and gives results of tests recently made by Lighthouse Service to obtain information and right effect.

Interference Prevention. The Prevention of Interference Between "Wired-Wireless" Circuits and Wireless Stations. Experimental Wireless, vol. 1, no. 10, July 1924, pp. 563-570, 9 figs. Gives details of methods which have been devised to eliminate interference from wireless stations.

Latticed Mast, Fiume Station. The Latticed Mast at the Radio Station of Fiume (L'albero a traliccio per la stazione R. T. di Fiume), P. Bertoglio. Rivista Marittima, vol. 57, no. 2, Feb. 1924, pp. 348-367, 11 figs. Details of calculations for a 164-ft. mast for supporting aerials.

Long-Distance. Long Distance Radio Transmission. Electrician, vol. 93, no. 2408, July 11, 1924, pp. 43-44. Discusses use of short waves in directional wireless telegraphy; apparatus used; short wave fallacies; effect of atmospherics; effect of using reflectors; energy magnification and high speed working made possible.

Long-Distance Telegraphy and Telephony (Die Technik der Telegraphie und Telephonie im Weitverkehr), F. Lüschen. Elektrotechnische Zeit., vol. 45, nos. 30 and 31, July 24 and 31, 1924, pp. 793-799 and 824-827, 22 figs. Discusses recent problems in long distance operating; describes Siemens and Halske rapid wire telegraphing system, radiotelegraphy, sending and receiving, atmospheric disturbances; cable telegraphy, wire telephony, multiple use of lines, wireless telephony, loud speakers, etc.

Notes on Wireless Matters, G. W. O. Howe. Electrician, vol. 93, nos. 2417 and 2421, Sept. 12 and Oct. 10, 1924, pp. 282-283 and 402-403, 6 figs. Discusses new theory of long distance radio communication; experiments confirming new theory.

Marine Station. The Cape Cod Marine System of the Radio Corporation of America, F. H. Kroger. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 243-253, 9 figs. Outline of character of traffic handling required in modern marine radiotelegraph communication system; describes Cape Cod multiplex marine station and operating problems encountered in supplementing sparks transmitting sets with vacuum tube transmitters; transmitting and receiving equipment.

Poulsen Arc. The Poulsen Arc, D. G. Bower. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 652-655, 4 figs. Treats of function of arc as generator of continuous waves; outlines methods used at commercial stations.

Propagation Phenomena. On Propagation Phenomena and Disturbances of Reception in Radio Telegraphy, F. Kiebitz. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 233-241. Study of propagation of electromagnetic waves over earth's surface, particularly for very long distance transmission, for which it is deduced that short waves are inherently unsuitable; methods of quantitatively determining strength of received signals are shown to be necessary; investigates simultaneous appearance of disturbances of reception at widely separated points and conclusions therefrom.

Receivers. Gridless Receiving and Amplifying Lamps with Control Plate [Ueber die gitterlose Empfangs- und Verstärkerlampe mit Steuerplatte (Plation)], H. Cohn. Zeit für technische Physik, vol. 5, no. 11, 1924, pp. 500-505, 12 figs. Describes lamp based on de Forest, in which cathode is between two plates, one electrode serving for control and other for electron current.

Reception. Periodic Trigger Reception, E. V. Appleton and F. S. Thompson. Instn. Elec. Engrs.—Jl., vol. 62, no. 326, Feb. 1924, pp. 181-186 and (discussion) 187-181, 8 figs. Theoretical discussion of phenomenon of oscillation hysteresis exhibited by simple triode generators; practical method of reception in which this phenomenon is utilized in periodic manner, which, for convenience, is termed periodic trriger reception, and is suitable for continuous-wave and spark signals.

The Relations between Damping and Speed in Wireless Reception, L. B. Turner. Instn. Elec. Engrs.—Jl., vol. 62, no. 326, Feb. 1924, pp. 192-201 and (discussion) 202-207, 17 figs. Examination of ordinary method of recorder working in radiotelegraph receivers, as affected by damping of receiver circuits; significances of decrement of any oscillatory system, and its bearing on possible speed of recording Morse signals; improved method of reception, called receiver curbing, is described and analyzed.

Ships. Wireless on Board Ship, J. A. Slee. Electrician, vol. 93, no. 2410, July 25, 1924, pp. 90-92, 5 figs. Recent progress in use and development of radio apparatus.

Short-Wave. Propagation of Electric Waves Over the Earth (Ausbreitung der elektrischen Wellen über die Erde), A. Meissner. Elektrotechnik u. Maschinenbau, vol. 42, no. 43, Oct. 26, 1924, pp. 625-630, 18 figs. See also Jahrbuch der drahtlosen Telegraphie u. Telephone, vol. 24, no. 4, 1924, pp. 85-92, 17 figs. Discusses new outlook due to short-wave operations, and hypotheses advanced. Concludes that Heavyside layer does not exist.

Results Obtained Over Very Long Distances by Short Wave Directional Wireless Telegraphy, More Generally Referred to as the Beam System, G. Marconi. Roy. Soc. of Arts—Jl., vol. 72, no. 3740, July 25, 1924, pp. 607-617 and (discussion) 617-621, 8 figs. Reviews developments, neglect of short waves; many problems can be solved only by short wave directional system; reflectors used in this system; successful tests carried out between Poldhu and Argentine.

Very Short Waves (Les ondes très courtes), M. Mesny. Onde Electrique, vol. 3, nos. 25 and 26, Jan. and Feb. 1924, pp. 25-37 and 99-110, 14 figs. Results of experiments with short waves carried out at laboratory of French Military Bur. of Telegraphy; describes arrangement employed for short waves; good results were obtained with waves only 2 m. long. Bibliography.

Stations. French 8 AE. Wireless Wld., vol. 14, no. 6, May 7, 1924, pp. 160-162, 3 figs. Describes successful transatlantic transmitting station installed by La T. S. F. Moderne at Rueil, near Paris.

Northolt Radio Station, A. C. Warren. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 967-969, 4 figs. Describes equipment at Post Office radio station and gives survey of experimental investigations carried out at station.

Receiving at the Sambeek Station (La réception à la station de Sambeek), N. Koomans. Radioélectricité, vol. 5, no. 64, July 25, 1924, pp. 74-78, 3 figs. Describes and explains apparatus used for receiving from India and America. Translated from Radio-Nieuws.

The Coltano Radio Station (Il centro radiotelegrafico di Coltano), G. Vallauri. Elettrotecnica, vol. 11, nos. 1 and 2, Jan. 5 and 15, 1924, pp. 2-12 and 27-36, 35 figs. Details of generating plant, antennas, towers, etc., of a recently built high-power station near Leghorn Italy; one of most powerful stations in world, and is able to transmit 10,000 words a day.

The Controlling Spark-Receiving Station at Zehlendorf (Die Hauptfunkempfangsstelle Zehlendorf), Ferd. Eppen. Elektrotechnische Zeit., vol. 45, no. 24, June 12, 1924, pp. 615-619, 10 figs. Communication from German Telegraph Tech.

Bur. giving details of spark wireless arrangements throughout German Empire, of which main transmitting station is in Berlin and receiving station at Zehlendorf (near Berlin), for scheme of communication to every large German town for commercial and other purposes; illustrations and details of valve receiving apparatus, cabin, frame aerials and goniometric arrangements.

The Leafield Imperial Wireless Service, E. H. Shaughnessy. Wireless World, vol. 13, no. 14, Jan. 2, 1924, pp. 443-448 and discussion (Jan. 9, 1924) pp. 482-484, 8 figs. 250-kw. arc station. Principle on which arc works; difficulties experienced in getting station into a going concern.

The Monte Grande High-Power Wireless Station "LPZ." Elec. Rev., vol. 95, no. 2445, Oct. 3, 1924, p. 494. Station is situated 20 km. from city of Buenos Aires; details of construction.

The Rugby Wireless Station. Engineer, vol. 138, no. 3584, Sept. 5, 1924, pp. 262-264, 15 figs. Describes wireless station capable of direct communication with India, Australia and other distant parts, which is being erected by Post Office at Hillmorton, near Rugby, Eng. To have 12 masts, arranged in two groups.

Towers. The Development of the Standard Design for Self-Supporting Radio Towers for the United Fruit and Tropical Radio Telegraph Companies, A. W. Buel. Inst. Radio Engrs.—Proc., vol. 12, no. 1, Feb. 1924, pp. 29-64 and (discussion) 65-82, 33 figs. partly on supp. plates. Historical review of company's radio towers; origin of 1906 design for 200-ft. towers; 50-ft. extension added in 1910; hurricane wrecks in 1914, 1915 and 1916, data deduced from them, and reconstruction of towers; preliminary designs for three-legged towers made in 1915, and their economy and advantages over four-legged towers; design of Tegucigalpa (Honduras) towers, with antenna bridges; economic comparison of semi-guyed towers and guyed steel masts with self-supporting towers; preliminary design for 1000-ft. tower.

Trains. Wireless Telegraphy on Trains. Engineer, vol. 137, no. 3558, Mar. 7, 1924, pp. 262-263. Account of trials made by Great West. Ry. to test feasibility of transmitting telegrams to trains in motion by wire telegraphy; describes receiver for this purpose designed by C. H. Gardner.

Transformers. Designing Small Power Transformers, W. James. Wireless Wld., vol. 14, no. 22, Aug. 27, 1924, pp. 621-623, 6 figs. Gives principles underlying design of small power transformers, giving number of representative designs.

Transmission. The Problem of "Pulling" (Kritisches über das Problem des Ziehens und seine Literatur), W. Albersheim. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 23-41, 10 figs. Discusses pulling and jumping of frequencies and strength of current in connecting intermediate circuits, and summarizes literature on subject.

Transmission and Reception. The Progress of Radiotelegraphy (Les progrés de la radiotélégraphie), G. Malgorn. Génie Civil, vol. 84, nos. 12 and 13, Mar. 22 and 29, 1924, pp. 269-274 and 303-307, 27 figs. Modern methods of automatic transmission and recorded reception; methods and apparatus for recording wireless signals.

Transmitters. Harmonic Oscillations in Tube Senders (Oberschwingungen des Röhrensenders), W. Albersheim. Archiv für Elektrotechnik, vol. 14, no. 1, Nov. 7, 1924, pp. 42-74, 26 figs. Calculation of oscillating circuit in a direct-coupled tube sender, and approximate determination of first and higher harmonics.

Twenty-kilowatt Vacuum Tube Radio Telegraph Transmitter, P. R. Fortin and C. A. Priest. Gen. Elec. Rev., vol. 27, no. 1, Jan. 1924, pp. 61-73, 33 figs. Describes commercial radio equipment employing radiotrons as generators of high-frequency power recently built for United Fruit Co. and now in operation at Tegucigalpa, Honduras.

Vacuum Tubes. See VACUUM TUBES.

Wave Meters. A Self-Contained Standard Harmonic Wave-Meter, D. W. Dye. Roy. Soc. Lond. —Philosophical Trans., vol. 224, no. A622, 1924, pp. 259-299, 18 figs. Survey of the various methods of measuring radiofrequency; develops principles of a highly accurate standard harmonic wavemeter, essential principle of which is an arrangement of three-electrode valves, known as a multi-vibrator, invention of H. Abraham and E. Bloch.

Wired. See TELEPHONY, Wired Wireless.

Wireless Exhibition, London. The Wireless Exhibition. Engineer, vol. 138, no. 3588, Oct. 3, 1924, pp. 378-380, 10 figs. Exhibition reveals tendency on part of wireless manufacturers to employ resistance capacity couplings instead of iron-core transformers for coupling together valves; modern valves for reception and transmission; loud speakers, etc.

RADIOTELEPHONY

Airplanes. Air Mail Radio Equipment, I. F. Byrnes. Gen. Elec. Rev., vol. 27, no. 8, Aug. 1924, pp. 492-497, 16 figs. Details of transcontinental radio equipment and its installation in airplanes, consisting of transmitter, receiver, control box, dynamotor, fairlead, antenna reel and fish.

Amplification, Low-Frequency. The Measurement of Low-Frequency Amplification, R. L. Smith-Rose. Wireless Wld., vol. 13, nos. 23 and 24, Mar. 5 and 12, 1924, pp. 699-702 and 731-734, 7 figs. Describes method of measuring low-frequency amplification; results of tests with resistance capacity, reactance capacity, and transformer couplings are given.

Amplifiers. High Frequency Amplifiers, H. T. Friis and A. G. Jensen. Bell System Technical Jl., vol. 3, no. 2, Apr. 1924, pp. 181-205, 14 figs. A simplified mathematical treatment of theory of high-frequency amplifiers is presented, and theory is verified by experiment. Description of various methods for quantitatively determining amount of amplification at high frequencies.

High-Frequency Amplifiers (Das Wesen des Hochfrequenz-Verstärkers), E. F. Medinger. Elektrotechnik u. Maschinenbau, vol. 42, no. 38, Sept. 21, 1924, pp. 285-287 (Radiotechnik), 8 figs. Discusses Schrack tubes and Armstrong super-regenerative receiver, and their use.

Push-Pull Speech Amplifier, W. James. Wireless Wld., vol. 14, no. 10, June 4, 1924, pp. 271-277, 7 figs. A special transformer coupled speech frequency amplifier designed to eliminate distortion, and employing ordinary receiving valves.

Theory of Reaction Amplifiers (Contributo alla teoria degli amplificatori a reazione), G. Filippini. Elettrotecnica, vol. 11, no. 33, Nov. 15, 1924, pp. 914-922, 9 figs. Discusses coupling of incoming and outgoing circuits; calculation of numerical value of coefficient of total amplification, and application of theory to a thermionic amplifier with magnetic coupling.

Two Stages of High Frequency Amplification, R. H. Cook. Wireless Wld., vol. 14, no. 20, Aug. 13, 1924, pp. 565-569, 13 figs. Describes how to make useful high-frequency amplifier.

Antennas. Design and Working of Antennas (Wirkungsweise und Bau von Antennen), W. Burstyn. Elektrotechnische Zeit. (special radio no.), 1924, pp. 27-30, 5 figs. Shows how aerial works as receiver and transmitter and discusses factors governing design; earth and frame antennas are included in discussion.

The Beverage Aerial, T. Lydwell Eckersley.

Electrician, vol. 92, no. 2382, Jan. 11, 1924, pp. 39-41, 6 figs. Its directive properties; comparison of relative merits of Beverage aerial and spaced aerials and frames.

Wireless Aerials and Lightning (Von Hochantennen und Blitzableitern), F. Moench. Telegraphen- u. Fernsprech-Technik, vol. 13, no. 6, June 1924, pp. 80-81. Author calls attention to importance of properly grounding aerial when not in use and during thunderstorms, and at same time disconnecting it from receiving apparatus; care should be taken to run ground circuit so as to avoid combustible materials; supports of aerial, if metallic, should be grounded.

Apparatus. Modern Wireless Equipment. Electrician, vol. 92, nos. 2404 and 2406, June 13 and 27, 1924, pp. 728 and 796-798, 12 figs. Survey of wireless apparatus exhibited at British Empire Exhibition, including broadcast receiving apparatus, headphones, sectional sets, wireless beam transmitter, receiving valves, molecular vacuum pump, etc.

Wireless Apparatus. Engineer, vol. 137, no. 3570, May 30, 1924, pp. 558-589, 3 figs. Exhibits of Radio Communication Co. at Brit. Empire Exhibition.

Automobiles. Radiophone Receiving in Automobiles or Yachts (La réception des émissions radiophoniques en automobile ou en yacht), P. Hémardinquer. Nature (Paris), no. 2630, Aug. 30, 1924, pp. 133-137, 8 figs. Discusses high frequency and low frequency portable apparatus and its operation.

Broadcasting. Disturbance in Broad Cast Receiving Due to Street Car Operation and Their Elimination (Ueber Störungen des Rundspruchempfangs durch den Strassenbahnbetrieb und ihre Beseitigung), F. Eppen. Elektrotechnische Zeit., vol. 45, no. 31, July 31, 1924, pp. 817-819, 1 fig. Experiments show that disturbance is due not to traction current but to lighting current.

Faithful Reproduction by Broadcast, P. P. Eckersley. Wireless Wld., vol. 14, nos. 9 and 10, May 28 and June 4, 1924, pp. 250-254 and (discussion) 289-294, 9 figs. Gives author's experiences in connection with problems of distortion in broadcasting, both in transmission and reception, and shows lines of development adopted in research work undertaken by B. B. C.

Siemens Broadcasting Apparatus (Das Siemens-Rundfunkgerät), H. Mayer. Siemens-Zeit., vol. 4, no. 7, July 1924, pp. 197-202, 12 figs. Describes apparatus for wave lengths of 200 to 700 m., andion receiver, rectifier, low frequency and high frequency, amplifiers, etc.

Broadcasting Stations. KDKA, the Radio Telephone Broadcasting Station of the Westinghouse Electric and Manufacturing Company at East Pittsburgh, Pennsylvania, D. G. Little. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 255-276, 25 figs. Describes three transmitting sets used, together with their auxiliary apparatus.

New Zurich Radio Broadcasting Station (La nouvelle station radiotéléphonique émettrice de Zurich). Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 9, Sept. 1924, pp. 475-479, 1 fig. Discusses development of broadcasting in Switzerland and foundation of Zurich Radio Assn. Description of new sending station.

Radio Broadcasting Station KGO, General Electric Company, Oakland, California, A. Stein, Jr. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 151-163, 42 figs. Description of antenna system, power station, control room and studio.

Radio Station KFKK, D. G. Little and F. Falknor. Elec. Jl., vol. 21, no. 1, Jan. 1924, pp. 25-30, 14 figs. Details of repeating broadcasting station at Hastings, Nebr.

The Birmingham Broadcasting Station. A. E. Thompson. Elec. Communication, vol. 2, no. 3, Jan. 1924, pp. 168-182, 17 figs. Station is equipped with West. Elec. Co.'s No. 101-A radio telephone broadcasting set; details of studio, microphone transmitters, condenser transmitter amplifier, no. 373-W carbon transmitter, control apparatus, volume indicator, radio transmitter, etc.; wavelength and range; antenna system.

The Radio Society's Transmitting Station 6 XX, P. R. Coursey. Wireless Wld., vol. 14, no. 1, Apr. 2, 1924, pp. 2-8, 7 figs. Description of station of Radio Soc. of Great Britain in London.

Zurich Sending Station for Radiotelephony Zürcher Sendestation für Radiotelephonie). Schweizerische Bauzeitung, vol. 84, no. 9, Aug. 30, 1924, pp. 111-112, 1 fig. Details of station on Höngg Mountain for broadcasting working with 100 amp. and giving antenan energy of 500 watt; present wave length, 650 m.

Broadcasting, Wired. Broadcasting by Wired Radio, R. D. Duncan, Jr. Elec. Wld., vol. 84, no. 4, July 26, 1924, pp. 157-160, 6 figs. Survey of results obtained from two years' experimental work into possibilities of wired broadcasting over electric lighting distribution systems.

Chemical Aspects. Chemical Aspects of Radio, C. Marx. Chem. Age (N. Y.), vol. 32, nos. 5, 8, and 11, May, Aug., and Nov. 1924, pp. 237-239, 353-355, and 449-452. May: Contributions of chemist to development of radio telephony. Aug.: Methods and means for detecting electromagnetic waves; coherers; electrolytic detectors; crystal detectors; Piezo-electrical crystals; Nov.: Thermionic devices or electron tubes.

Cottrell Precipitator Disturbances. The Elimination of Radio Disturbances Caused by Cottrell Precipitators, R. E. Boehler. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 422-424, 2 figs. Describes method of eliminating these disturbances which has proved very effective in its application to plants of Universal Portland Cement Co.

Crystals. Oscillating Crystals, O. Lossey. Wireless Wld., vol. 15, no. 4, Oct. 22, 1924, pp. 93-96, 8 figs. Observations on behavior of crystals while in an oscillating condition.

The Crystal as a Generator and Amplifier, V. Gabel. Wireless Wld., vol. 15, nos. 1 and 2, Oct. 1 and 8, 1924, pp. 2-5 and 47-50, 13 figs. Reviews all that has so far been recorded by way of observations on action of crystal and gives methods for testing crystals for oscillating properties, with practical details on how to prepare crystals for the purpose. Supplies a number of circuits and explains their operation.

Detectors. Crystal Detectors as Oscillators (Generateur-amplificateur sans lampe), I. Podliasky. Radioélectricité, vol. 5, no. 60, May 25, 1924, pp. 196-197, 3 figs. Capacity and inductance are connected in series with 12-volt battery and variable resistance of 1000 ohms; zincite-steel combination is placed as shunt across capacity and inductance; with suitable values point may be found on crystal which causes circuit to oscillate at frequency dependent on values of capacity and inductance; use of capacities and inductances of such a value as to give audible frequency is recommended as making a search for sensitive point on crystal much easier.

Effect of Pressure on the Operation of Solid Contact Detectors (Influence de la force pressante sur le fonctionnement des détecteurs à contact solide), J. Cayrel. Académie des Sciences—Comptes Rendus, vol. 179, no. 4, July 28, 1924, pp. 259-261. In order to verify conclusions reached in analytical work on theory of contact detectors, author has made experiments on effect of pressure between surfaces, and gives results obtained.

New Applications of the Sodion Detector. H. P. Donle. Inst. Radio Engrs.—Proc., vol. 12, no.

2, Apr. 1924, pp. 159-175, 18 figs. Describes tector; gives power chracteristics and indicates further improvements in new type of simple depossibilities of use of this device in various types of receiving circuit, and also in measurement of signal strength, such as for observations of fading.

Discharge Tubes. On Some Properties of Low-Tension Discharge Tubes, J. Taylor. Experimental Wireless, vol. 2, no. 13, Oct. 1924, pp. 41-47, 7 figs. Deals with volt-ampere characteristics of low-tension discharge tubes and gives an interpretation of different portions of them. How peculiarities of characteristics have been applied practically. Experiments on use of "Osglim" lamps for detection of wireless waves.

Duplex. Duplex Telephony, P. P. Eckersley. Experimental Wireless, vol. 2, no. 14, Nov. 1924, pp. 101-104, 5 figs. Outlines problems of Duplex radiotelephony and describes a few methods of achieving and operating it.

Grid Rectification. Grid Rectification. A Critical Examination of the Method, J. H. Reyner. Experimental Wireless, vol. 1, no. 9, June 1924, pp. 512-520, 12 figs. Describes method and investigates its action in detail, after which reference is made to limitations of system.

Head Telephones. The Manufacture of Head Telephones for Wireless Reception. Engineering, vol. 128, no. 3074, Nov. 28, 1924, p. 747. New design especially intended for reception of broadcast telephony, manufactured by Brit. Thomson-Huston Co.

High-Frequency Measurement. The Measurement of High Frequencies, F. E. Nancarrow. P. O. Elec. Engrs.' Jl., vol. 17, part 3, Oct. 1924, pp. 209-217, 6 figs. Accounts of measurements made at Radio Laboratory with piece of apparatus called Multivibrator, controlled by valve-maintained tuning fork.

High-Frequency Resistance. An Experimental Determination of High Frequency Resistance, W. G. White. Experimental Wireless, vol. 1, no. 12, Sept. 1924, pp. 735-737, 7 figs. Describes experiments on measurement of high-frequency resistance of copper wires.

Impedances. The Graphical Analysis of Composite Impedances, F. M. Colebrook. Experimental Wireless, vol. 2, no. 15, Dec. 1924, pp. 140-145, 15 figs. Considers some of the important arrangements of impedances met with in practical wireless telephony and telegraphy, and shows their characteristics graphically.

Interference. Effect of Interference on Reaction Receivers ("Influence du brouillage sur les récepteurs à réaction), L. Brillouin and E. Fromy. Onde Electrique, vol. 3, nos. 28, 29, and 30, Apr., May, and June 1924, pp. 181-189, 268-278, and 299-313, 15 figs. Results of experiments to determine effect of wave interference, or jamming with reaction receiver or receiver connected to amplifiers; study of receivers of one and several lamps.

Radio Interference Elimination, R. H. White. Elec. Rev., vol. 95, nos. 2444, 2447, and 2449, Sept. 26, Oct. 17, and 31, 1924, pp. 464-465, 565-567, and 644-645, 4 figs. Sept. 26: Methods which may be employed without altering any connections in existing receiver. Oct. 17: Finer methods of rejection of unwanted signals. Oct. 31: Filter circuits.

The Elimination of Static Interference, E. M. Terry. Wis. Engr., vol. 28, no. 8, May 1924, pp. 155-158 and 172, 4 figs. Discusses principal causes of disturbances and describes methods by which they can be partially eliminated.

See also Wave Propagation.

Lightships. Communication with Lightships. P. O. Elec. Engrs.—Jl., vol. 16, part 4, Jan. 1924, pp. 409-420, 9 figs. Particulars of communication established between North Goodwin Lightship and Ramsgate Post Office; describes aerial, transmitting and speaking devices, and transmitting and receiving apparatus for calling.

Long-Distance. See RADIOTELEGRAPHY, Long-Distance.

Loud-Speaker Horns. The Function and Design of Horns for Loud Speakers, C. R. Hanna and J. Slepian. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 250-256, 10 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1191-1197, 3 figs. Discusses function of horn and design of horn to perform this function in best way; gives proof to show that exponential increase in section gives best results; appendix gives analytical solution of sound propagation in exponential horns; formulas are developed which make possible design of horns.

The Performance and Theory of Loud Speaker Horns, A. N. Goldsmith and J. P. Minton. Inst. Radio Engrs.—Proc., vol. 12, no 4, Aug. 1924, pp. 423-478, 11 figs. Details of tests at various frequencies carried out with conical horns used for receiving and transmitting; by measuring sound pressure at point on axis of horns about 15 cm. from mouth, curves show sound pressure in dynes at frequencies up to 4000 cycles.

Loud Speakers. Discussion on Loud-Speakers for Wireless and Other Purposes. Instn. Elec. Engrs.—Jl., vol. 62, no. 327, Mar. 1924. Contains following papers: General Principles Involved in the Accurate Reproduction of Sound by Means of a Loud-Speaker, A. O. Rankine, pp. 265-268; Theory of Loud-Speaker Design: Some Factors Affecting Faithful and Efficient Reproduction, L. C. Pocock, pp. 268-270, 2 figs. Sources of Distortion in the Amplifier, C. L. Fortescue, pp. 270-273, 8 figs.; Acoustic Problems of the Gramophone, H. L. Porter, pp. 273-274; Relative Importance of Each Frequency Region in the Audible Spectrum—Measurements on Loud-Speakers, E. K. Sandeman, pp. 275-278, 5 figs.; Overtones of the Diaphragm of a Telephone Receiver, J. T. MacGregor-Morris and E. Mallett, pp. 278-280, 2 figs.; Auditorium Acoustics and the Loud-Speaker, G. A. Sutherland, pp. 280-283, 7 figs.; Some Directions of Improvement in the Loud-Speaking Telephone, S. G. Brown, pp. 283-284; Characteristics of a New Type of Loud-Speaker, P. P. Eckersley, p. 284; discussions, pp. 285-298, 14 figs.

Loud-Speaking Telephone System for Addressing Large Audiences (Luidsprekend telefoonsysteem voor het toespreken van een groot auditorium), E. Wollner. Ingenieur, vol. 39, no. 45, Nov. 8, 1924, pp. 879-887, 19 figs. Loud-speaking systems for local uses; general arrangement, theory and design of condenser, microphone, and testing of same by means of pistophone or thermophone; Western Electric loud-speaking telephones; intensifiers; diagrams of connections. Loud-speaking systems for long-distance transmission. English and American loud-speaker designs.

Magnetophones. The Marconi-Sykes Magnetophone, H. J. Round. Wireless Wld., vol. 15, no. 9, Nov. 26, 1924, pp. 260-265, 11 figs. Description of microphone and associated equipment which is used extensively not only for broadcasting stations but also for public speech amplifying, distributing and amplifying band music, etc.

Modulation. Modulation in Radiotelephony (La modulation en Radio-téléphonie), P. Maurer. Electricien, vol. 55, no. 1359, Nov. 1, 1924, pp. 484-488, 18 figs. Discusses three-electrode tubes as generators, transmission of sustained waves of a given frequency without variation in power, modulators and their operation, direct and indirect use of microphones, etc.

Note on Systems of Modulation Employed in Radio Telephony, H. S. Walker. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 643-646,

3 figs. Gives notes on up-to-date practical systems employed to modulate valve transmitter for telephonic transmission; discusses choke and grid control systems and efficiencies of various methods compared.

Noise. Parasites in Radiotelephony and Their Elimination (Les parasites in T. S. F. et leur élimination), P. Maurer. Electricien, vol. 40, no. 1352, July 15, 1924, pp. 322-325, 11 figs. Discusses present state of question, and shows that total elimination is impossible; recommends use of receivers with special filtering and amplifying devices.

Numans Circuit. The Numans Oscillator, K. C. van Ryn. Experimental Wireless, vol. 2, no. 15, Dec. 1924, pp. 134-136, 5 figs. Describes a new valve circuit from Holland that may be used with either single or double-grid valves, and makes an effective wavemeter.

Poulsen Arc Operation. Poulsen Arc Operation on Coupled Circuits (Funzionamento dell'arco Poulsen su circuiti accoppiati), G. Pession. Elettrotecnica, vol. 10, no. 33, Nov. 25, 1923, pp. 800-803, 3 figs. Demonstrates that operation of Poulsen arc on coupled circuits is not substantially different in its results from operation of triod tubes. New theory based upon rational physical foundations and a series of tests that verify theoretical conclusions is reported and fully explained.

Public-Address System. Stevens' New Public Address System, L. C. W. Conrow. Stevens Indicator, vol. 41, no. 5, Oct. 15, 1924, pp. 122-123 and 134, 5 figs. Describes Western Electric public address system which provides means for amplifying and so distributing speech and sounds of ordinary audibility that they may be heard in natural tone by everyone in crowd of 2 or 3 thousand people.

Radio Frequency, Measurements at. Measurements at Radio Frequency, A. Hund. Elec. World, vol. 84, no. 19, Nov. 8, 1924, pp. 998-1000, 3 figs. Method for rapid determination of effective resistance and inductance of coils and straight conductors; uses variable condenser and resistor to replace variable inductor.

Receivers. A Four-Electrode Valve Receiver, G. L. Morrow. Experimental Wireless, vol. 1, no. 9, June 1924, pp 520-524, 5 figs. Describes four-electrode valve receiver; electrode system consists of cylindrical plate, outer grid of mesh construction and cylindrical shape, within which is inner grid of usual spiral form, plate and two grids being arranged in concentric assembly round straight filament.

A Four-Valve Dual Neutrodyne Receiver, W. James. Wireless World, vol. 13, nos. 18 and 19, Jan. 30 and Feb. 6, 1924, pp. 555-559 and 587-589, 8 figs. Describes receiver having two stages of high-frequency amplification, with first stage dualled, detector, and one stage of ordinary note magnification; operating particulars.

Atmospherics and Their Effect on Wireless Receivers, E. B. Moullin. Instn. Elec. Engrs.—Jl., vol. 62, no. 328, Apr. 1924, pp. 353-366 and (discussion) 366-372, 11 figs. Mathematical analysis of effect of atmospheric upon wireless receiver; calculation of effect of each of several wave forms and comparison of results; consideration of possible advantage from use of aperiodic antenna or of slightly distuned periodic circuit; comparison of rectified current produced by atmospheric with that produced by signal.

Broadcast Receiving sets, E. E. Barnett. S. African Inst. Elec. Engrs.—Trans., vol. 15, part 3, Mar. 1924, pp. 355-361, 4 figs. Outline of recent developments and indication of what is to be expected from different types of sets.

Self-Contained Three-Valve Receiver, W. F. Gildersleve. Wireless Wld., vol. 14, no. 1, Apr. 2, pp. 14-20, 10 figs. Consists of one stage of H. F. amplification, detector and one note magnifier; easy to construct and makes use of a minimum number of component instruments; easy manipulation.

Simplifications of the Superheterodyne (Les simplifications du dispositif superhétérodyne), P. Hémardinquer. Radioélectricité, vol. 5, no. 66, Aug. 25, 1924, pp. 216-218, 5 figs. Discusses principle of superheterodyne receiving, and gives details of simplified mounting methods.

The Problem of Current Supply for A. C. Receivers (Le problème de l'alimentation des récepteurs en alternatif), M. Barthelemy. Onde Electrique, vol. 3, no. 25, Jan. 1924, pp. 12-24, 11 figs. Result of author's investigation to find means of direct heating of receivers with alternating current.

The Super-Heterodyne—Its Origin, Development, and Some Recent Improvements, E. H. Armstrong. Inst. Radio Engrs.—Proc., vol. 12, no. 5, Oct. 1924, pp. 539-552, 13 figs. Describes development of superheterodyne receiver from wartime invention into commercial form of broadcast receiver apparatus now available to general public; success is due to low-filament-consumption vacuum tube and to reduction in number of tubes required by self-heterodyning, reflexing, and improvement in transformer design.

Theory and Construction of Radiotelegraph Receiving Apparatus (Theorie et construction des appareils récepteurs de la téléphonie sans fil), M. Veaux. Annales des Postes Telegraphes & Telephones, vol. 13, nos. 1, 2, 3, and 5, Jan., Feb., Mar., and May, 1924, pp. 1-20, 109-116, 225-240, and 457-465, 97 figs. For all waves, but especially for wave of 450 m. Jan.: Practical details of construction of receiving antenna. Feb.: Utilization of receiving frames. Mar.: Oscillating circuit. May: Definition of wavelength in propagation of electromagnetic waves; chart giving relation between wavelength, frequency and pulsation.

Receiving Apparatus, Screening. Some Experiments on the Screening of Radio Receiving Apparatus, R. H. Barfield. Instn. Elec. Engrs.—Jl., vol. 62, no. 327, Mar. 1924, pp. 249-262 and (discussion) 262-264, 13 figs. Investigation to obtain quantitative information on effect of screens, of which dimensions are small compared with length of waves they are intended to screen; measurements demonstrate important part played by closed circuits in screening magnetic field of radio waves, and show that effective screen may be constructed of wire netting; effect of screens on electric field of waves is measured; essential points to be observed in design of efficient screens for various purposes.

Receiving Circuits, Selective. Selective Receiving Circuits, N. W. McLachlan. Wireless Wld., vol. 15, no. 7, Nov. 12, 1924, pp. 189-193, 6 figs. Reviews conditions by which energy is set up and transferred in tuning system of a receiver.

Receiving Sets, Testing of. Some Methods of Testing Radio Receiving Sets, J. L. Preston and L. C. F. Horle. U. S. Bur. Standards—Technologic Papers, no. 256, Mar. 26, 1924, pp. 203-228, 8 figs. Describes methods of measurement of electrical characteristics of a radio receiving set and formulates statements of features which may be learned by an inspection of electrical and mechanical design of a set. Summary of data from measurements of sensitivity and selectivity or sharpness of resonance of 28 receiving sets of various types, made by 15 manufacturers, using methods described.

Reception. A New Invention for Selective Reception, J. Scott-Taggart. Radio News, vol. 5, no. 8, Feb. 1924, pp. 1056-1057, 1120, 1122, 1124, and 1126, 5 figs. With system described it will be possible to operate transmitters on waves with

difference of but a few meters of each other; outline of invention patented by author.

Conditions for Good Radiotelephonic Reception (Limiti e condizioni di una buona ricezione in radiotelefonia), O. M. Corbino. Elettrotecnica, vol. 11, no. 11, Apr. 15, 1924, pp. 239-240, 1 fig. Author calls attention to fact that in 1905 he demonstrated that modulated wave could be decomposed into two waves slightly different from one another; this observation has assumed today great importance in radiotelephony; advantage of relatively flat curves of resonance in receiver is emphasized.

Distortion-Free Reception and Reproduction of Speech and Music in Radiotelephony (Verzerrungsfreie Aufnahme und Wiedergabe von Sprache und Musik in der Radiotelephonie), J. Engl. Elektrotechnische Zeit. (special radio no.), 1924, pp. 11-14, 10 figs. Notes on conversion of sound energy in high-frequency energy in its separate phases, and characterization of conditions governing distortion-free reception of high-frequency energy for its re-conversion into sound energy.

On Optimum Heterodyne Reception, E. V. Appleton and Mary Taylor. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 277-293, 4 figs. Use of triode for anode rectification and cumulative grid rectification in heterodyne reception is investigated theoretically and results given; optimum grid condenser value obtained theoretically is in good agreement with practical value.

Rectifiers for Battery Charging. See RECTIFIERS.

Regeneration in Coupled Circuits. Regeneration in Coupled Circuits, L. Chaffee. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 299-350, 35 figs. Develops simple theory of regeneration in single oscillatory circuit, both when oscillatory element is in plate circuit and in grid circuit of regenerating tube; reviews theory of couple circuits having positive resistances; develops theory of regeneration in coupled circuits, and shows that regeneration in secondary circuit affects only impedance of that circuit and may make equivalent resistance of that circuit zero or negative.

Relation to Telephony. Radio and Its Relation to Telephony, W. B. Schulte. Telephony, vol. 86, no. 25, June 21, 1924, pp. 24-26. Magnitude of radio and opportunity offered; possibility of wired wireless for farm lines; broadcasting and toll revenues; merchandising of radio equipment.

Short Period Variations in Radio Reception, G. W. Pickard. Inst. Radio Engrs.—Proc., vol. 12, no. 2, Apr. 1924, pp. 119-158, 39 figs. Continuous records of electric-field intensity at distance of from 11 to 2600 km. from various broadcasting stations are made by amplifying and rectifying received current from open antenna, and recording galvanometer deflections produced by this current; these records show complex curve containing periodicities ranging from seconds to tens of minutes; transition from day to night conditions is shown; simultaneous records at separated receiving points are found to be dissimilar, and records of different distant stations taken at same receiving point are shown to be unlike; hypothesis for these fluctuations is advanced.

Short-Wave. Results Obtained Over Long Distances by Means of Directed Radiotelegraphy with Short Waves (Risultati ottenuti su lunghissime distanze mediante la radiotelegrafia direzionale ad onde corte, più genericamente nota come "il sistema a fascio"), G. Marconi. Telegrafi e Telefoni, vol. 5, no. 4, July-Aug. 1924, pp. 179-184. Discusses short wave developments and successful radiotelephony between England and Australia.

Signaling System. Radio Telephone Signaling, Chas. S. Demarest, M. L. Almquist and L. M. Clement. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 210-218, 26 figs. Describes signaling system which serves to extend to field of radiotelephony same sort of calling facilities as are now available in wire telephony; by its means radio attendants or subscribers are enabled to signal each other without requiring that called party should have to listen with receiver; system is intercommunicating with capacity for large number of stations on one wavelength; fields of usefulness, characteristics, and apparatus employed.

Sound-Transmission Systems. High Quality Transmission and Reproduction of Speech and Music, W. H. Martin and H. Fletcher. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 230-238, 10 figs. General requirements for such transmission systems, and factors to be considered in design and operation; extent to which desired results can be obtained with means now available.

Trains. Missouri Pacific Experiments with Train Radio, R. E. Krueger. Ry. Elec. Engr., vol. 15, no. 12, Dec. 1924, pp. 430-431, 1 fig. Account of experiences with radio equipment; antenna system; reception while standing still; results while moving; interference.

Radio Coach 6ZZ, P. R. Coursey. Wireless World, vol. 14, no. 16, July 16, 1924, pp. 446-451, 5 figs. Preliminary report of transmission and reception tests on express train. Tests were eminently satisfactory and shows that two-way communication with express train moving at high speed is possible, not only over very limited distances, but also over considerable ranges running upward of 100 mi.

Radio Telephony on Railway Trains, E. J. Collier. Elec. Rev., vol. 94, no. 2421, Apr. 18, 1924, pp. 612-613. Eperiments made by Great West. Ry. Co. on trains running between Paddington and Birmingham.

Report of the Committee on the Application of Radio to Moving Trains. Ry. Elec. Engr., vol. 15, no. 10, Oct. 1924, pp. 338-340, 3 figs. Installations and tests made on private cars on transcontinental runs.

Transformers. The Performance and Properties of Telephonic Frequency Intervalve Transformers, D. W. Dye. Experimental Wireless, vol. 1, no. 12, and vol. 2 nos. 13 and 14, Sept., Oct., and Nov. 1924, pp. 691-699, 12-21, and 74-84, 25 figs. Analyzes transformer experimentally and theoretically under conditions of use. Describes methods for measuring effective primary inductance and resistance of telephonic frequency transformers. Means of evaluating secondary inductance and self-capacity.

Transmission. Faithful Reproduction in Radio-Telephony, L. C. Pocock. Instn. Elec. Engrs.—Jl., vol. 62, no. 333, Sept. 1924, pp. 791-807 and (discussion) 807-815, 14 figs. Defines terms suitable to scientific study of faithful reproduction, analyzes into separate constituents types of distortion occurring, and lays down general principles and gives them as far as possible a mathematical form. Principal types of apparatus employed in radiotelephony. Bibliography.

Short Wavelength Transmission, W. James. Wireless World, vol. 13, nos. 13 and 14, Dec. 27, 1923, and Jan. 2, 1924, 9 figs. Describes master oscillator system.

Signal-to-Static Interference Ratio in Radio Telephony, M. Latour. Inst. Radio Engrs.—Proc., vol. 12, no. 3, June 1924, pp. 295-297, 3 figs. Describes system of twin side-band radiotelephonic transmission, wherein carrier component is suppressed, but which differs from other carrierless transmitting systems in that homodyne receiver is not required; this last peculiarity makes system particularly suitable for short wavelength transmission.

The Holweck Demountable Valve. Wireless Wld., vol. 14, no. 15, July 9, 1924, pp. 422-423, 3 figs. Recent improvements in valve intended for

transmission constructed so that it can be easily dismantled for fitting new filament or modifying arrangement of electrodes.

Transmitting Equipment for Radio Telephone Broadcasting, E. L. Nelson. Instn. Radio Engrs. —Proc., vol. 12, no. 5, Oct. 1924, pp. 553-577, 13 figs. Outlines general transmission considerations applying to any system for high-quality transmission of speech or music, and discusses specific requirements to be met by various apparatus units in radio broadcasting equipment; describes standard West. Elec. 500-w. broadcasting equipment, which has found application in some 50 of larger stations in United States and abroad.

Why Wireless Electric Rays Can Bend Round the Earth, Jos. Larmor. Nature (Lond.), vol. 114 no. 2870, Nov. 1, 1924, pp. 650-651. Gives what is supposed to be sufficient and rather striking cause for transmission of long waves horizontally round earth at great latitudes, though rays traveling at lower heights would be gradually quenched.

Transmitters. Output and Wavelength of Tube Senders with Internal Back Coupling (Leistung und Wellenlänge des Röhrensenders mit innerer Rückkopplung), E. Alberti and G. Zickner. Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt, vol. 7, no. 2, 1924, pp. 247-258, 7 figs. Investigation of self-excitation in tube senders with back coupling over capacity between anode and grid, and with grid circuit capable of tuning.

Radio Set with Arc Transmitters. Eng. Progress, vol. 4, no. 12, Dec. 1924, pp. 250-253, 6 figs. Fundamental idea and development of apparatus; new transmitting method by means of magnetic control; Pungs' new method for arc telephony by means of microphone; 4-kw. Lorenz-Poulsen transmitter in Lingby, Denmark; most recent German arc transmitters.

Telephony and C. W. Transmitters for 100 Meters, G. E. Minvalla. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 629-631, 4 figs. Deals with elimination of losses which are likely to occur at very high frequencies.

The Design of Transmitting Valves, G. L. Morrow. Experimental Wireless, vol. 1, no. 10, July 1924, pp. 585-588, 3 figs. Gives fundamental principles underlying design of transmission valves.

The Mechanical Generation of Short Waves (Die maschinelle Erzeugung kleiner Wellen), K. Schmidt. Elektrotechnische Zeit. (special radio no.), 1924, pp. 22-26, 10 figs. Discusses basic principles of frequency multiplication, and manner of speed regulation of high-frequency transmitter sets, as developed by author.

Wireless Telephony, C. W. Kollatz. Eng. Progress, vol. 4, no. 12, Dec. 1924, pp. 259-265, 12 figs. Transmission of speech waves; transmitters for continuous waves; radiotelephony with arc transmitters, high-frequency machines, tube transmitters; reception.

Vacuum Tubes. See VACUUM TUBES.

Valves. See Receivers; Transmission.

Wave Meter. The Measurement of Radio- Frequency and Wave-Length. Elec. Rev., vol. 95, no. 2441, Sept. 5, 1924, pp. 351-352, 4 figs. Instrument is made up as three separate units, as follows: (a) compound multivibration unit, consisting of two multi-vibrators in cascade, mounted in one box together with controlling tuning fork, (b) selector circuit consisting of specially designed variable air condenser and six stranded wire inductance coils, (c) selective amplifier for amplifying interference tones resulting from interaction of selected harmonic and local or external radio-frequency source.

Wave Propagation and Interference. The Propagation of Electric Waves and Interferences (Ueber die Ausbreitungsvorgänge elektrischer Wellen und ihre Störungen), A. Esau. Elektrotechnische Zeit. (special radio no.), 1924, pp. 15-18, 8 figs. It is shown that atmosphere and surface conditions of earth have very great influence on propagation of electric waves, manifesting itself in changes of intensity and displacement of incidence direction of wave.

Wired. See TELEPHONY, Wired Wireless.

RADIUM

Alpha-Particles Emitted from. Number of α-Particles Emitted from Radium. Scintillation Method (Die Zahl der von Radium ausgesandten α-Teilchen), H. Geiger and A. Werner. Zeit. für Physik, vol. 21, no. 3, Feb. 8, 1924, pp. 187-203, 2 figs. R dermination by refined methods, according to which α-particles are counted by scintillation method and a value 3.40×10^{10} α-particles per gramme of Ra per sec. obtained; using this value and assuming Millikan's value for it, half-value period of radium is given as 1730 years.

Australia. Underground Riches of the Commonwealth. Indus. Australian & Min. Standard, vol. 71, no. 1836, Feb. 14, 1924, pp. 237-238, 2 figs. Particulars regarding stores of radium in South Australia; discovery of great scientific importance and practical value.

Emanation Measurement. Exact Measuring of Emanation of Radium (Uber die Präzisonsmessung der Radiumemanation), A. Becker. Zeit. für Physik, vol. 21, no. 5, Feb. 25, 1924, pp. 304-315, 2 figs. Discusses conditions under which exact measurement can be carried out by means of α rays, free from objections, and its practical realization.

Extraction from Ores. Experiments on the Extraction and Recovery of Radium from. Typical American Carnotite Ores, Including Contributions to Methods of Measuring Radium, H. H. Barker and H. Schlundt. Univ. of Mo.—Bul., vol. 24, no. 26, Eng. Experiment Station Series 23, Sept. 1923, 87 pp., 15 figs. Results of investigation undertaken to compare different methods of treating ores for extraction and recovery of radium, to test applicability of the various methods to different types of ores, to devise new methods of treatment and modifications of existing processes for extraction from virgin ore, to study and compare different methods for recovery of uranium and vanadium to determine their respective efficiency and quality of product obtained, and to study electrical and analytical methods involved in determining radium in the various products obtained in its commercial production.

Mexico. The Radium Ores of Mexico (Los minerales de radio en México), M. P. y Lasso. Ingeneria Internactional, vol. 12, no. 3, Sept. 1924, pp. 127-128, 1 fig. Geological details of ores in which radium is found and tests made to determine its quantity.

Russian Industry. The Radium Industry in Russia, S. Alkesandrov. Russian Min. Jl., vol. 100, no. 1, Jan. 1924, pp. 7-10. (In Russian.)

RAILLESS TRACTION

Rochester, N. Y. Rochester Trackless Trolley Construction. Elec. Ry. Jl., vol. 64, no. 1, July 5, 1924, pp. 11-13, 4 figs. Line is about 3 mi. long and runs through densely populated district; it crosses five electric car lines and one steam railroad at grade; some of overhead equipment is of special design.

Trolley Buses. See BUSES, Trolley.

RAILROAD; RAILROADS. See RAILWAY; RAILWAYS.

RAILS

Bonding. See ELECTRIC WELDING, ARC, Rail Bonds.

Conductor, Under Contact Type. Under-Contact Conductor Rails. Electrician, vol. 92, no. 2381, Jan. 4, 1924, pp. 10-11, 7 figs. Describes new design giving complete protection for high-tension traction.

Corrugation. How Rail Corrugation Has Been Eliminated in Pittsburgh, I. E. Church. Elec. Ry. Jl., vol. 64, no. 3, July 19, 1924, pp. 83-85. Results of investigations made of circumstances under which in past corrugation developed and track structure was designed to prevent its recurrence.

Investigation of Corrugation of Rails with Aid of Torsiograph (Untersuchung der Riffelbildung an Schienen mit Hilfe des Tersiographen), J. Geiger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 12, Mar. 22, 1924, pp. 283-284, 7 figs. Measurement on rolling cars shows plainly that corrugation is due to frictional oscillations, resulting from irregular speeds of both wheels of same axis when traveling over curves.

Rail Corrugation Experience. Elec. Ry. Jl., vol. 63, no. 7, Feb. 16, 1924, pp. 255-260, 7 figs. Survey of railways in various parts of United States, giving new data as to extent of this trouble; practices followed in removing and cost, and comments as to causes.

Creeping. Creeping of Rails (Das Wandern der Schienen), M. Koenen. Zentralblatt der Bauverwaltung, vol. 44, no. 32, Aug. 6, 1924, pp. 270-271, 2 figs. Assumes creeping due to rotation of earth and makes calculations accordingly.

Longitudinal Dislocation or Creeping of Rails (O Deslocamento longitundinal ou Caminhamento dos Trilhos), J. C. de Andrade Pinto. Revista Brasileira de Engenharia, vol. 8, no. 3, Sept. 1924, pp. 73-78, 6 figs. Shows from experiments that creeping of rails can easily be avoided by using retaining plates explained.

Failure. Breaking of Rails; and Rail Joints, W. C. Cushing. Int. Ry. Congress Assn.—Bul., vol. 6, no. 10, Oct. 1924, pp. 677-792, 42 figs. Classification of rail failures, rail failure analysis, record of failures, breakages attributable to use to which rails are put and breakages attributable to defects in metal in rails, rail designs, specifications, chemistry and wear of rails, operating statistics, etc. Most economical and efficient arrangement of rail joints; types of joints; freedom for expansion of rails; quality of metal in fish-plates; first cost of installing and maintaining joints, and specifications for quenched-carbon, alloy, and high-carbon joint bars, and for coiled spring washers.

Broken Rails. Ry. & Locomotive Eng., vol. 37, no. 5, May 1924, pp. 150-152, 4 figs. Extracts from reports on broken rails that caused derailments and loss of life, published by Bur. Safety.

Rail Failure Statistics for 1922, J. B. Emerson. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 263, Jan. 1924, pp. 393-402, 5 figs. partly on p. 391. Statistics collected for year ending Oct. 31, 1922, including rollings for 1917 and succeeding years. Tables.

Split Head Type of Rail Rupture. Railroad Herald, vol. 28, no. 6, May 1924, pp. 26-28, 2 figs. Abstract of report of J. E. Howard, on accident which occurred Nov. 21, 1923, on Phila. & Reading Ry., near Annville, Pa., which was due to fracture of a rail which displaced a split-head type of rupture.

Frogs. Finishing Steel Track Equipment, F. B. Jacobs. Iron Trade Rev., vol. 74, no. 26, June 26, 1924, pp. 1701-1702, 3 figs. Notes on methods and equipment used at plant of Indianapolis Switch & Frog Co., Springfield, Ohio, in production of solid manganese steel frogs, switches and crossings.

Wheel Guiding Flange Frogs for St. Louis Terminal. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1093-1094, 2 figs. Eliminates guard rails, thereby reducing track maintenance. Solid and built-up frogs.

Furnaces for Heating. See FURNACES, HEATING, Rail-Heating.

Grooved, Standardization of. International Standardization of Grooved Rails (Internationale Normung der Rillenschienen). Verkehrstechnik, no. 23, June 6, 1924, pp. 229-231, 3 figs. Proposed international profiles by Swiss Standard Assn. in agreement with international union of street cars and narrow gage lines.

Impact on, Otheograph Tests on. See ELECTRIC LOCOMOTIVES, Developments.

Inspection. Modern Methods and Results of Rail Inspection (Neuere Wege und Erbegnisse der Gleisuntersuchung), Stierl. Bautechnik, vol. 2, nos. 9 and 10, Feb. 29 and Mar. 14, 1924, pp. 66-68 and 82-85, 39 figs. Describes apparatus recently developed in Germany for inspection of rails and results obtained with them.

Joint-Grinding Machine. A New Rail Grinding Machine (Eine neuartige Schienen-Schleifmaschine(, M. König. Verkehrstechnik, no. 32, Aug. 8, 1924, pp. 335-337, 1 fig. Describes electric machine for grinding joints by means of corundum wheels, reducing cost for each joint over 80 per cent and producing more exact work.

Joints. A Non-Deflecting Rail Joint. Indian Eng., vol. 75, nos. 1 and 2, Jan. 5 and 12, 1924, pp. 10-11 and 24-25, 10 figs. on supp. plates. Details of joint proposed by Bradford Leslie.

Investigation of Seam Welded Rail Joints, R. B. Fehr. Am. Welding Soc.—Jl., vol. 3, no. 1, Jan. 1924, pp. 28-60, 17 figs. Results of investigation along following lines: Functions of seam welded rail joints and stresses to which they are subjected; improvements in joint structure and welding processes; development of practical method for making accelerated tests on seam-welded joints; and comparative tests on seam-welded joints in which variations have been made in either mechanical structure or welding process.

Progress Report No. 2 of Committee on Welded Rail Joints. Am. Welding Soc.—Jl., vol. 3, no. 2, Feb. 1924, pp. 48-88, 28 figs. Report of committee organized by Am. Elec. Ry. Assn. and Am. Bur. of Welding to investigate various types of welded rail joints in commercial use. Summary of tests.

Rail Joint Designs Presenting New Features. Eng. News-Rec., vol. 93, no. 14, Oct. 2, 1924, pp. 536-537, 4 figs. Describes five rail joints now in experimental service, viz., Hyle joint, with separate wearing plates, Neafie joint, having plain bars with joints not anchored to ties, Roach hinge joint, head-free joint, in which bars are without top contact, and 100 per cent joint.

Specifications for Quenched Carbon Steel Joint Bars. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 263, Jan. 1924, pp. 406-408. Specification covering materials, chemical and physical requirements, design and tolerance, manufacture, inspection, and marking.

Welded Rail Joints for Street Railways, A. T. Spencer. Elec. News, vol. 33, no. 15, June 15, 1924, pp. 77-78. Describes various types in use and gives methods used by Toronto Transportation Commission.

Welding Rail Joints on Iron Railroad Bridges (Versuche mit geschweissten Schienenstössen auf eisernen Eisenbahnbrücken), J. Stern. Bautechnik, vol. 2, nos. 24 and 25, June 6 and 13, 1924, pp. 243-245 and 255-257, 6 figs. Describes in detail process of Electro-Thermit Co. in Berlin applied usually to street car tracks, in which joints are filled with mechanical mixture of aluminum and Fe_2O_3, and its successful application to railroad tracks on bridge over Oder at Steinau and under section Breslau-Glogau.

See also Failure; ELECTRIC WELDING, ARC, Rail Joints.

Laying. Canadian Pacific Lays 29.7 Miles of 85-lb. Rail in Two Days. Ry. Eng. & Maintenance, vol. 20, no. 9, Sept. 1924, pp. 342-344, 6 figs. Further developments of method permit of greater output of working forces; work consisted of two stretches of track 9 mi. apart on single-track line between Mattawamkeag, Me., and Brownville Junction and was done under light traffic.

Laying Rail with a Machine in India. Ry. Eng. & Maintenance, vol. 20, no. 4, Apr. 1924, pp. 157-159, 4 figs. Labor-saving equipment which may be applied to advantage even where wages are extremely low.

Life of. Mill Treatment Doubles the Life of Rail. Elec. Ry. Jl., vol. 64, no. 4, July 26, 1924, pp. 123-125, 1 fig. Service tests made by Boston Elevated Ry. show wear on Sandberg sorbitic rail to be only about one-half that on untreated rail in same track; cost of treated rail is slightly higher.

Securing the Maximum Life of Rail in Track, B. M. Cheney. Eng. & Contracting (Railways), vol. 62, no. 1, July 16, 1924, pp. 129-133. Average age of rail varied from 5.6 to 13.6 yr.; gives factors that determine length of service.

Low-Carbon. Low Carbon Rails Show Less Transverse Fissures, C. W. Gennet, Jr. Ry. Age, vol. 76, no. 2, Jan. 12, 1924, p. 186, 1 fig. Results of tests show that tendency for fissures to develop increases with carbon content of steel.

Manufacturing Practices. Report of Rail Committee, A. R. E. A. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 576-577, 4 figs. Study of rail manufacturing practices, including rail failures, desirable rail length, joint bars and method of treatment, rail sections, movement of contiguous rails through bolted joints, etc. (Abstract.)

Old, Rerolling into Bars and Shapes. Make Rail Steel Products in 8 States, E. C. Boehringer. Iron Trade Rev., vol. 74, no. 15, Aug. 10, 1924, pp. 979-981, 3 figs. Points out that there are 19 mills in United States and Canada engaged in conversion of old steel rails into bars and shapes; describes mill practice; physical properties of rail-steel bars.

Rerolling Old Railroad Rails Into Rods, A. Noell. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 866-869, 10 figs. Methods of operation in rolling with oblique pressure; reduction of sectional area in rolling; influence of steel strength. (Abstract.) Translated from Stahl u. Eisen.

Quality Improvement. How the Quality of Rails Can Be Improved, C. W. Gennet, Jr. Ry. Age, vol. 77, no. 2, July 12, 1924, pp. 63-65, 2 figs. Suggestions for changes in specifications to secure a better grade of steel.

Rail-Laying Machine. See Laying.

Rolling. Calculating Passes of Rails (Zur Berechnung von Schienenkalibrierungen), H. Cramer. Stahl u. Eisen, vol. 44, no. 34, Aug. 21, 1924, pp. 1012-1015, 7 figs. Discusses calculations to determine on straight passes, upset passes, etc., to obtain equal elongation of various parts of profiles.

Sections. Comparison of Standard A. R. A. and A. R. E. A. Rail Sections. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 263, Jan. 1924, pp. 409-431. Forty-five diagrams of various rail sections with data comparing principal dimensions and features. See also recommended design for 150-lb. rail section, p. 392.

Slag, Corrosive Effect of. Corrosive Effect of Slag, W. R. Dunham. Elec. Ry. Jl., vol. 64, no. 17, Oct. 25, 1924, p. 732, 1 fig. Detroit investigation shows 54 per cent of base of rails eaten away in 21 years.

Steel, Milled-End. Late Developments in Steel Rail Practice, C. W. Gennet, Jr. Iron Age, vol. 113, no. 24, June 12, 1924, pp. 1721-1722. Lengths of 39 ft. with ends milled; tie plates, from steel from top of ingots; improved hot-bed treatment regarded important.

Wear. Causes of Wear of Rails (Les causes de l'usure des rails de chemins de fer). Génie Civil, vol. 85, no. 23, Dec. 6, 1924, pp. 521-523, 4 figs. Extract from book entitled Wear and Defects of Rails, by Ch. Fremont. Shows that wear is not due to abrasion but to crushing. Choice of steel for rails.

Welding. Thermit Process Gives Good Results in Youngstown, D. J. Graham. Elec. Ry. Jl., vol. 64, no. 20, Nov. 15, 1924, pp. 841-842, 10 figs. This method of welding is used in installation and repair of crossings, switches and mates, compromise joints and other special trackwork. Has been standard of Youngstown Mun. Ry. since 1916.

Welding Rails in Brooklyn. Reactions, vol. 17, no. 3, 1924, pp. 43-46, 8 figs. Brooklyn-Manhattan Transit Corpn. and Brooklyn City R. R. use thermit process on large proportion of its lines being reconstructed; advantages of thermit process.

Welding of Non-Imbedded Tracks (Schweissung freiliegender Gleise), Wattmann. Maschinenbau, vol. 3, no. 24, Sept. 22, 1924, pp. 902-904. Experiences in track welding and comparative cost of welded joints and fishjoints. See translation in Eng. Progress, vol. 5, no. 9, Sept. 1924, p. LIX, 1 fig.

Wheel Thrust on. Otheograph Records of Steam and Electric Locomotives, P. M. Gillilan. Gen. Elec. Rev., vol. 27, no. 3, Mar. 1924, pp. 179-181, 7 figs. Notes on a device for recording thrust on rails by each separate wheel of a locomotive or motor car; shows by a graphic record amplitude and characteristic of both vertical and transverse thrust of all wheels on each tie. Describes records made.

Otheographic Records of Wheel Effects on Rails. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 441-442, 5 figs. Tests of electric and steam locomotives; charts show load and lateral thrust imposed by each passing wheel.

The Otheograph of the General Electric Company. Ry. & Locomotive Eng., vol. 37, no. 6, June 1924, pp. 163-168, 5 figs. Instrument designed to measure lateral and vertical stresses imposed on rails.

RAILWAY CONSTRUCTION

Africa. Railway Building in Morocco. Ry. Gaz., vol. 40, no. 2, Jan. 11, 1924, pp. 46-48, 4 figs. Particulars of a system which will comprise 670 miles of railway, both broad and narrow gage, extending from Marrakesh at foot of Atlas Mts. in southwestern corner of French Protectorate, to Oudjda on border of Algeria, with a line running due north from Petitjean to Tangiers in Spanish Morocco.

Canada. A Larger Program of Railroad Building, C. S. Gzowski. Ry. Rev., vol. 75, no. 19, Nov. 8, 1924, pp. 683-690, 14 figs. Construction of lines which now make up Canadian national railways system in Western Canada.

Cut-Off Construction. A 3 1/3-Million Cubic Yard Job on the Burlington. Excavating Engr., vol. 18, no. 5, May 1924, pp. 174-180, 22 figs., partly on pp. 84-85. Description of Morris & Dougherty's big contract for construction of 18 miles of cut-off between Frederick and Vermont, Ill., on Chicago, Burlington & Quincy Railway. 13 shovels and one dragline excavator, in ad-

dition to a great fleet of locomotives and dump cars, employed.

Building the Waukegan Cutoff on the North Shore Line. Elec. Ry. Jl., vol. 64, no. 4, July 26, 1924, pp. 119-122, 5 figs. Initial 5-mile section to be operated by Chicago Rapid Transit Co.; grade separation at streets and railroad crossings insures fast schedule; use of automatic pumps solves difficult drainage problem; announcement of extension creates spectacular real estate boom.

New 17-Mile Cut-off Eliminates Pusher Service. Ry. Age, vol. 77, no. 11, Sept. 13, 1924, pp. 442-446, 10 figs. Details of construction work involved in project of Chicago, Burlington & Quincy to expedite coal traffic. Pusher grade opposing Burlington's heavy northbound coal movement from southern Illinois being eliminated. Comprises building of an alternate line on a practically continuous 25 per cent grade from point two miles north of Beardstown, Ill., to Vermont, at an estimated cost of about $143,000 per mile.

New York Central R. R. Completes Castleton Cut-Off. Ry. Rev., vol. 75, no. 26, Dec. 27, 1924, pp. 1015-1024, 20 figs. Construction details of huge project which has been under construction for two years and was officially opened Nov. 20, 1924; new line eliminates excessive grades, shortens distance, gives initial increase of yard capacity, permits efficient methods of yard operation, etc.

Grade Analysis. Analysis of Railroad Grades for Classification, S. Vilar Y Boy. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 255-263. Author seeks to solve general problem of grade analysis mathematically, giving results to fit any actual condition by simply substituting values in a general formula.

Hudson River Connecting R. R. Building the Hudson River Connecting Railroad. Eng. News-Rec., vol. 92, no. 3, Jan. 17, 1924, pp. 108-111, 7 figs. Need for new Hudson River crossing at Albany; economies to be effected by new line; details of great classification yard at Selkirk.

Improvement and Statistics, 1923. Improvement Is Present Keynote of American Railroads, E. E. R. Tratman. Eng. News-Rec., vol. 92, no. 1, Jan. 3, 1924, pp. 14-16. Double-tracking, grade reduction and line revision for efficiency in handling heavy traffic; grade separation in cities; enlarging yards, terminals and passing tracks.

Railway Construction Resumed on Large Scale. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 50-58, 2 figs. Improvements during 1923 involved chiefly terminal, second track, and other operating necessities; statistics on railway construction in United States in 1923.

Santa Fe Ry., Kansas. Santa Fé Railway Builds Low-Grade Line in Kansas. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 275-279, 6 figs. New route permits increased train loads; diversion at Eldorado; construction methods in earthwork, concreting and structures.

Widening Work, England. Widening of the London and North Eastern Main Line. Ry. Gaz., vol. 40, no. 20, May 16, 1924, pp. 707-711, 16 figs., partly on pp. 705-706. Widening works on Great Northern section of L. N. E. R. at Huntingdon and Peterborough will, on completion, considerably improve facilities for working traffic by substituting 4-line for 2-line sections at these points; track rearrangement and bridges; engineering details; erecting steelwork.

RAILWAY ELECTRIFICATION

Advantages. Railroad Electrification, F. E. Wynne. Ry. Club Pittsburgh—Proc., vol. 23, no. 6, Apr. 24, 1924, pp. 140-158 and (discussion) 158-163. Advantages of railway electrification and details of accomplishments.

Africa. Cape Peninsula Railway Electrification. S. African Power Engr., vol. 9, nos. 77 and 78, Sept. and Oct. 1924, pp. 15-20 and 25-27, 1 fig. Report on electrification of Cape Town-Simons' Town, Monument-Sea Point, and Monument-Table Bay Docks lines. Estimates of capital outlay.

Austria. Electric Traction on the Austrian Federal Railway (Elektrische Zugförderung auf den österreichischen Bundesbahnen), P. Dittes. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 10, Mar. 8, 1924, pp. 233-240, 17 figs. Program for electrification of portion of network; electrification of Arlberg line Innsbruck-Landeck-Bludenz: hydroelectric plants, transmission lines, railway and overhead lines, electric locomotives, etc.; 73-km. electrified section between Innsbruck and Landeck is in operation since end of 1923 and Arlberg section to Bludenz will be in operation before end of 1924, thus completing electrification of 243 km.

Electrification of the Austrian Federal Railways, Jas. A. G. Pennington. Ry. Rev., vol. 75, nos. 13 and 14, Sept. 27, and Oct. 4, 1924, pp. 470-475, and 508-511, 7 figs. Present state of enterprise. Sept. 27: Operating characteristics and traffic density; conditions which necessitate change of motive power. Oct. 4: Hydroelectric plants, scheme of transmission and distribution, and motive power.

Brazil. Electric Operation of Paulista Railway in Brazil, G. Bellows. Ry. Age, vol. 76, no. 16, Mar. 22, 1924, pp. 789-791, 6 figs. Electrification shows large savings on road which must use wood or imported coal for fuel; locomotive performance.

British Empire Exhibition. First World Power Conference. Ry. Gaz., vol. 41, no. 4, July 25, 1924, pp. 121-124, 2 figs. Abstracts of papers on electrification of railways read at British Empire Exhibition. Electric Traction in Italy, F. Tajani; Electrification of Railways in Norway, H. J. Schreiner; Power Problems of Sweden Railways, I. Ofverholm.

British Railways. The Future of Main-Line Electrification on British Railways, H. E. O'Brien. Instn. Elec. Engrs.—Jl., vol. 62, no. 333, Sept. 1924, pp. 729-755 and (discussion) 755-781, 9 figs. Shows that probable density of traffic in ton-miles on main railway arteries is so great that cost of energy, including all capital charges, will not be prohibitive, also that cost of electric locomotives will not be a capital charge, and that when reductions in cost of locomotive operation and maintenance (due to simple construction of electric locomotive) are taken into account, total cost of locomotive operation is substantially less for electricity than for steam.

Chile. Electrification of the Chilean Section of the Transandian Railway Via Juncal (Informe sobre la electrificación de la sección chilena del transandino por Juncal), A. J. Fifer. Instituto de Ingenieros de Chile—Anales, vol. 24, no. 6, June 1924, pp. 340-367, 3 figs. Discusses line from Los Andes (Chile) to Mendoza (Argentina) of 133 km., rising from 834 meters above sea level to 3207 meters and terminating at 768 meters; traffic details, electric equipment and rolling stock proposed.

Coal Carriers. Electrification of Coal Carrying Railroads, T. C. Wurts. Modern Min., vol. 1, no. 1, Aug. 1924, pp. 2-4, 5 figs. Describes electric operation of Norfolk & West. Ry.; locomotives used are split-phase type; single-phase power, at potential of 11,000 volts, is collected from trolley wire and stepped down to operating potential by means of transformers mounted on locomotive.

Contact System. Contact System for Virginian Electrification, C. L. Hancock. Ry. Age, vol. 77, no. 14, Oct. 4, 1924, pp. 597-598, 12 figs. Virginian Ry. electrifying its lines between Mullins, W. Va., and Roanoke, Va. Entire construction including contact wire, messenger and fittings to be non-ferrous material.

Developments. The Electrification of Foreign Railways, Including Recent Developments and Projects, S. Parker Smith. World Power, vol. 2, nos. 1, 2, 4, and 11, Jan., Feb., Apr., and Nov. 1924, pp. 44-51, 111-116, 216-223, and 279-284, 5 figs. Jan.: Germany. Feb.: Austria and Hungary. Apr.: France and Holland. Nov.: Canada, Mexico, Brazil, Chile, Argentine, South Africa, India, Australia, New Zealand, Japan, and Spain.

Financial Aspects. The Financial Aspects of Main Line Electrification, Phil. Dawson. World Power, vol. 2, no. 11, Nov. 1924, pp. 274-278. Author seeks to disprove idea that only where water power is available, or in case of mountain lines, can complete electrification of railway system be justified.

France. Electrification of the French Midi Railway, A. Bachellery. Instn. Elec. Engrs.—Jl., vol. 62, no. 327, Mar. 1924, pp. 213-218 and (discussion) 218-231, 3 figs. Account of extensive electrification work now pursued by Midi Railway in accordance with new standard regulations of French Government, and of first results obtained on electrified lines.

Electrification of the Paris Suburban Lines of the State Railways (Note sur l'électrification des lignes de Banlieue des chemins de fer et l'état), M. C. Thomas. Revue générale des Chemins de Fer, vol. 43, nos. 1 and 2, July and Aug. 1924, pp. 3-25 and 109-119, 30 figs. Details of lines, generating stations, permanent way, traction and transformer substations, third-rail equipment; electric locomotives, rolling stock, motor coaches, etc.

Electrification of the Paris Suburban Lines of the State Railways (L'électrification des lignes de banlieue des Chemins de fer de l'Etat), P. Calfas. Génie Civil, vol. 85, no. 12, Sept. 20, 1924, pp. 245-251, 20 figs. Particulars of new rolling stock, railway motor cars, power houses, substations, and equipment.

Paris Suburban Lines Electrification. Elec. Ry. & Tramway Jl., vol. 49, no. 1206, Oct. 12, 1923, and vol. 50, no. 1219, Jan. 11, 1924, pp. 201-205 and 19-22, 14 figs. Changes in construction and general arrangement of St. Lazare station; describes electric motor car to be used on State Rys., designed for a strict minimum of stopping time at stations.

Germany. Electrification of the Berlin Elevated Railway (Betrachtungen zur Elektrisierung der Berliner Stadt- und Vorortbahnen), Schlemmer. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 205-210, 8 figs., partly on supp. plate. Change from steam operation is discussed, electrical plants and equipment are described, and economical questions treated.

Holland. The Question of Electrification of the Dutch Railways (Die Elektrisierungsfrage in Holland), J. J. van L. Martinet and H. Ebert. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 230-233, 2 figs. Single-phase current, 15,000 volts and 16 2/3 cycles is recommended. Power is generated at 50 cycles and transformed to lower frequency for railway operation.

Illinois Central. Electrification Progress on the I. C. R. R. Elec. Traction, vol. 20, no. 6, June 1924, pp. 256-257, 4 figs. Work on complete elimination of grade crossings from Chicago to Kankakee are well under way; next cars purchased will be completely equipped for electrical operation.

Italy. The Status of Railway Electrification in Italy (Der Stand der Elektrisierung in Italien), G. Huldschiner. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 233-237, 6 figs., partly on supp. plate. Three-phase system, which is mostly used in Italy, is described and its advantages emphasized.

Japan. Electrification Program for Japanese Roads. Ry. Elec. Engr., vol. 15, no. 3, Mar. 1924, pp. 84-87, 17 figs. Abstract of report prepared by S. T. Dodd. Abundant water power and limited coal supply are powerful influences in developing electric traction.

London Metropolitan. The Electrification of the Metropolitan Railway. World Power, vol. 2, no. 11, Nov. 1924, pp. 305-309, 4 figs. Details of power station, permanent way, and rolling stock.

Norway. Electric Railway Operation in Norway (Elektrisk Jernbanedrift). Teknisk Ukeblad, vol. 71, nos. 33, 34, and 36, Sept. 16, 20, and 30, 1924, pp. 283-287, 295-297, and 308-311, 3 figs. Discussion at meeting of Railway Committee of Norwegian Engrs. Assn. on electrification of Norwegian railways. Experts favor a single-phase system of 15,000 volts and 15 cycles, similar to one adopted in Sweden. Electrification in other countries.

Pennsylvania. Electrification of the Ft. Washington Branch, P. R. R. Ry. Rev., vol. 74, no. 19, May 10, 1924, pp. 843-845, 5 figs. Previous electrical installation in Philadelphia suburban district extended over 6.2 mi. of single track.

Russia. See ELECTRICAL INDUSTRY, Russia.

South Africa. The Electrification of the South African Railways, W. Hoy. S. African Eng., vol. 35, no. 1, Jan. 1924, pp. 3-5, 6 figs. Main features of conversion from steam to electric operation of portion of line from Glencoe Junction to Pietermaritzburg, bringing progress of work up to November.

Spain. The 3000-volt Electrification of the Spanish Northern Railway, A. I. Totten and H. C. Hutchinson. Gen. Elec. Rev., vol. 27, no. 10, Oct. 1924, pp. 658-664, 11 figs. Section between Ujo and Busdongo now being electrified as initial step of extensive program. Describes this most recent substitution of electric locomotives for steam locomotives, locomotives themselves, motors, control, auxiliary equipment, substations, transformers, motor-generator sets, and overhead line construction.

Switzerland. Electrification of the Swiss Railways (Die Elektrisierung der Schweizer Bahnen), Tetzlaff. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 9-10, Aug. 30, 1924, pp. 218-229, 13 figs. Describes systems used, historic development, map of electrified roads, high-pressure hydraulic power plants, transmission lines, and various types of electric locomotives. Data on cost of electrification.

Main Line Railway Electrification, S. Parker Smith and Phil. Dawson. Engineer, vol. 137, nos. 3571, 3572, and 3573, June 6, 13, and 20, 1924, pp. 633-636, 653-654, and 684-685, 27 figs. June 6: Electrification of Swiss railways; reasons for electrification; choice of system; tabular data one electric rolling stock; present state of electrification; Berne-Loetschberg-Simplon railway; tabular data on supp. plate of different lines. June 13: Rhaetian railway; Swiss federal railways; single-phase lines. June 20: Simplon tunnel and Brique-Sitten 3-phase lines; Freiburg-Murten-Ins railway; Burgdorf-Thun railway.

Present Status of Railway Electrification of the Federal Swiss Railroad (L'Etat actuel de

l'électrification des Chemins de fer fédéraux suisses). Génie Civil, vol. 84, no. 26, June 28, 1924, pp. 609-614, 7 figs. See also Elec. Ry. & Tramway Jl., vol. 50, no. 1242, June 13, 1924, pp. 273-277, 6 figs. Progress in electrification; working current, single-phase 15,000-volt, 16 2/3 periods, generated in hydroelectric power stations; 525 out of 2900 km. are now electrified.

Railway Electrification Progress in Switzerland, A. Rohn. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 18-19, 4 figs. Progress of electrification movement of Swiss Federal Railways. More than 400 km. of lines operating by electric power; will equip 1150 km. in next four years.

The Electrification of the Swiss Federal Railways. Int. Ry. Congress Assn.—Bul., vol. 6, no. 12, Dec. 1924, pp. 1122-1150, 19 figs. Progress of work of electrification; general scheme; cost of electrification; brief description of main installations; results of working.

United States. The Electrification of Railways in United States, Including Recent Developments and Projects, S. P. Smith. World Power, vol. 2, nos. 6 and 7, June and July 1924, pp. 338-346 and 38-44, 6 figs. Deals with roads electrified in America.

Virginian Ry. The Virginian Railway Electrification, H. K. Smith. Ry. Age, vol. 76, no. 27, June 7, 1924, pp. 1353-1358, 9 figs. See also Ry. Elec. Engr., vol. 15, no. 6, June 1924, pp. 169-174, 10 figs. Outline of conditions which caused management to adopt electric traction; electric locomotives; plan of operation with electric locomotives; power equipments; transmission and distribution system.

RAILWAY EQUIPMENT

British Empire Exhibition. British Empire Exhibition: Railway Material. Engineering, vol. 118, nos. 3061 and 3066, Aug. 29 and Oct. 3, 1924, pp. 279-284, and 475-479 and 488, 58 figs. partly on supp. plates. Aug. 29: Describes exhibits, including freight cars, car trucks, and a heavy 4-8-0 type superheater locomotive built for Buenos Ayres Great Southern Ry. Co., exhibited by W. G. Armstrong, Whitworth & Co. Oct. 3: Details of car built by Metropolitan Co. for King of Egypt for use on Egyptian State Rys.; other exhibits, including Reid-MacLeod geared steam-turbine locomotive.

Depreciation. Depreciation of Railway Equipment, J. E. Muhlfeld. Ry. & Locomotive Eng., vol. 37, no. 2, Feb. 1924, pp. 41-49, 5 figs. Depreciation accounts; physical condition of composite properties such as locomotives and cars.

Germany. Railway Session and Show at Seddin and the Technical High School of Charlottenburg (Rückblick auf die Eisenbahntechnische Tagung mit Ausstellungen in Seddin und in der Technischen Hochschule Charlottenburg), D. Przygode. Glasers Annalen, vol. 95, nos. 11 and 12, Dec. 1, and 15, 1924, pp. 283-300 and 303-323, 69 figs. Details of equipment exhibited, including rolling stock, locomotives, bearings, Knorr brake, Koppel cars, cranes, motors, etc.

Siemens Works at the Railway Show (Die Siemens-Werke auf der Eisenbahntechnischen Ausstellung). Siemens Zeit., vol. 4, no. 11-12, Nov.-Dec. 1924, pp. 402-433, 68 figs. Particulars of equipment exhibited at Seddin show, including mercury-vapor rectifiers, pantographs, storage-battery locomotives and motor cars, line masts, electric express locomotives, signaling equipment, measuring instruments, etc.

Technical Railway Exposition at Seddin (Die Eisenbahntechnische Ausstellung Seddin), W. Kraska. Elektrotechnische Zeit., vol. 45, nos. 48 and 50, Nov. 27, and Dec. 11, 1924, pp. 1301-1307 and 1377-1384, 51 figs. Particulars of exhibits, including mercury-vapor rectifiers, electric welding equipment, temperature and speed- measuring devices, signals, ticket-printing equipment, passenger and freight electric locomotives, etc.

Progress in 1923. Manufacturers Make Noteworthy Progress in 1923. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 85-93, 28 figs. Brief general description of outstanding achievements of equipment builders; coaling stations, cranes and ditchers, water valves, tractors and trailers, motor cars, and machine tools.

The Year's Tendencies in Equipment Design. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 32-33, 2 figs. Three-cylinder locomotives; more powerful motor cars; individuality in inside finish of diners.

Train Ferries. See FERRIES, Train.

RAILWAY MAINTENANCE

Culvert Blocking, Prevention. Treatment to Prevent Blocking of Culverts by Debris. Ry. Rev., vol. 74, no. 13, Mar. 29, 1924, pp. 599-601, 3 figs. Also special treatment to prevent washing and deposits of debris by water in side ditches.

Equipment, Cost Accounting. Cost Accounting in the Mechanical Department, G. W. Armstrong. Ry. Age, vol. 77, no. 9, Aug. 30, 1924, pp. 363-367, 3 figs. Deals with cost account as related to maintenance of equipment. Cost knowledge and proper analysis of data will assist production control and develop economies.

Expense Analysis. Analysis of Equipment Maintenance Expenses, J. L. White. Ry. Age, vol. 76, no. 9, Mar. 1, 1924, pp. 507-510. Review of information available in accounts and explains methods for its use.

Labor-Saving Equipment. Organizing to Secure Economies from Labor Saving Equipment, W. J. Backes. Ry. Eng. & Maintenance, vol. 20, no. 3, Mar. 1924, pp. 93-95, 5 figs. Detailed work programs, supervision and repair facilities are necessary to get results.

Mechanical Equipment. Maintenance Requirements for the Mechanical Equipment of a Railroad, P. L. Battey. West. Soc. Engrs.—Jl., vol. 29, no. 11, Nov. 1924, pp. 405-415, 7 figs. Describes scope of analysis made for Receiver of Denver & Rio Grande West. R. R., so that he could include in his budget for general rehabilitation of railroad, the terminal facilities and repair shops for mechanical department necessary to maintain motive power and car equipment in first-class operating condition.

Methods, Lehigh Valley R. R. Maintenance Methods on the Lehigh Valley R. R., Geo. L. Moore. Ry. Rev., vol. 75, no. 21, Nov. 22, 1924, pp 824-826. Methods and practices used in connection with maintenance work, and reasons why some of them were adopted.

RAILWAY MANAGEMENT

Accounting. Labor-Saving Appliances in Accounting Work. Ry. Rev., vol. 75, no. 1, July 5, 1924, pp. 1-6, 11 figs. Varied uses of adding and calculating machines, billing machines, electric sorting and tabulating machines, loose-leaf devices, car index systems, etc., in railway accounting work, together with their possibilities in helping to effect greater economies in office operation.

Railway Accounting. Ry Age, vol. 77, no. 3, July 19, 1924, pp. 113-121. Abstracts of papers and reports presented at 36th annual meeting of Railway Accounting Officers Assn., held at San Francisco, Cal., dealing with efficient accounting, expense classification, statistics, and general, freight, passenger, and disbursement accounts.

The New Problems of the Accounting Officer, A. J. County. Ry. Age, vol. 77, no. 3, July 19, 1924, pp. 109-112. Reduction in statistical requirements and simplification offer greatest opportunity for study.

Budget System. See INDUSTRIAL MANAGEMENT, Budgeting.

Car-Department Service. The Meaning of Effective Car Department Service, L. K. Sillcox. Car Foremen's Assn.—Proc., vol. 19, no. 3, Dec. 1924, 39 pp. (including discussion), 8 figs. See also Ry. Age, vol. 77, nos. 24 and 25, Dec. 13 and 20, 1924, pp. 1075-1079 and 1121-1124, 7 figs. Discusses elements involved in organization of car department and presents valuable information as to actual work and methods pursued; deals with material and human elements, coördination of which builds organization for successful operation.

Employee Representation. See EMPLOYEES' REPRESENTATION.

Expense Classification. The Proposed Operating Expense Classification. Ry. Age, vol. 76, no. 5, Feb. 2, 1924, pp. 325-328. Tentative revision of classification circulated by Bur. of Accounts of Interstate Commerce Commission.

Forecasting Traffic. Forecasting Future Volume of Railway Traffic, J. B. Blood. Ry. Age, vol. 76, no. 6, Feb. 9, 1924, pp. 369-371, 3 figs. View presented on basis of mathematical study that recent estimates are not large enough.

Railroad Traffic and the Business Cycle, H. B. Vanderblue. Ry. Age, vol. 76, no 20, Apr. 19, 1924, pp. 987-990, 7 figs. Shows how individual carrier is assisted in forecasting tonnage volume; traffic of Southern Ry.

Mechanical Statistics. The Problem of Mechanical Statistics, J. E. Slater. Ry. Age, vol. 76, no. 31, June 14, 1924, pp. 1524-1525. Limitations of classification of operating expenses for purposes of adequate analysis. Cost of work performed.

Purchases and Stores. Purchases and Stores. Ry. Age (Daily Edition), vol. 76, no. 34, June 17, 1924, pp. 1641-1659, 6 figs. See also Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1204-1211. Contains following articles: Purchasing Function of the Government, H. C. Smither; Committee recommendations: Stores Department Book of Rules; Method for Material Procurement, E. J. Remensnyder; Committee report on Material Accounting and Office Appliances; report of Committee on General Accounting; Bonus System for Efficient Stockmen, J. E. Mahaney; report on Department Buildings and Facilities; Duties of a Traveling Storekeeper, W. Dixon; and other addresses. Papers and reports presented before Am. Ry. Assn.

Stores Department. Soo Line Has Unique Stores Organization. Ry. Rev., vol. 75, no. 24, Dec. 13, 1924, pp. 943-948, 13 figs. Organization of stores department of Minneapolis, St. Paul & Sault Ste. Marie Ry.; general storekeeper controls supplies of commissary department and news agents, keeps time records and accounts of trainmen and enginemen; describes main store of Soo Line at Minneapolis.

Stores Department Activities on M.-K.-T. Lines. Ry. Rev., vol. 75, no. 14, Oct. 4, 1924, pp. 495-500, 14 figs. Large reclamation plant at Parsons, Kan., and supply train with special oil-car features.

The Evolution of a Stores Department, O. Nelson. Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1169-1174, 12 figs. Practices followed in stores department of Union Pacific; office detail; operation of supply trains, material yards, and oil houses.

Supervisory Forces, Training of. Proper Training of Shop Supervisory Forces, L. W. Baldwin. Ry. Rev., vol. 74, no. 26, June 28, 1924, pp. 1256-1258. Discusses training of supervision and developing of men better fitted for mechanical positions. Systematic record of progressive steps should be kept and stipulated examinations at stated intervals should be given. From paper read before Am. Ry. Assn. annual convention.

RAILWAY MOTOR CARS

Bearings for. See BEARINGS, ROLLER, Railway Motor Cars.

Brill. Brill Builds Large Rail Motor Car. Ry. Age, vol. 77, no. 26, Dec. 27, 1924, pp. 1155-1157, 6 figs. Seats 59 passengers and is designed to haul trailer seating 60 additional persons; driven by 6-cylinder engine which develops 190 hp. at 1300 r.p.m.

New Gasoline Railcar Is Developed by J. G. Brill Co. Automotive Industries, vol. 50, no. 16, Apr. 17, 1924, pp. 860-863, 8 figs. Is mounted on two 4-wheel trucks, power being applied to all wheels of forward unit; semi-automatic air-braking system used; vehicle carries baggage as well as passengers; power plant mounted in front.

Development. Automotive Rail-Cars and Their Development. Soc. Automotive Engrs.—Jl., vol. 14, no. 6, June 1924. Contains following papers: The Modern Motor Rail-Car, M. L. McGrew, pp. 649-656, 4 figs.; Motorized Railroad Equipment, E. J. Brennan, pp. 656-659, 2 figs.; Motorization of "Light-Service" Rail-Transportation, E. Wanamaker, pp. 659-662. See also (discussion) vol. 15 no. 3, Sept. 1924, pp. 195-198.

Traction for Light Railways, H. O. Mance. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 1007-1028. Present situation as regards rail motor traction; traction for narrow-gage light railways, including steam locomotives, petrol-electric locomotives, and petrol tractors; road rail system, for dealing with problem of feeder lines for light traffic over difficult country.

Diesel-Electric. Construction of Railway Oil-Motor Cars (Der Bau der Eisenbahn-Oeltriebwagen), G. Soberski. Verkehrstechnik, no. 34, Aug. 22, 1924, pp. 355-358, 6 figs. Design, construction and equipment of cars, four-stroke, six-cylinder internal-combustion engine using light oil, 950 r.p.m., 75 hp. with coolers at each end of car, compressed air for speed change gear, storage battery for motor starting and car lighting.

Modern Railway Motor Car (Moderne Triebwagen), M. Rintelen. Fördertechnik u. Frachtverkehr, vol. 17, no. 12, June 18, 1924, pp. 161-162. Discusses Diesel-electric cars and new speed gears of A. E. G.

Drewry. A Double-Bogie Petrol Rail Car. Engineer, vol. 137, no. 3554, Feb. 8, 1924, pp. 152-153, 3 figs. Narrow-gage car built by Drewry Car Co. for Barbados Government Ry.

Drewry Motor Rail Vehicles. Motor Transport (Lond.), vol. 38, no. 1008, June 23, 1924, pp. 769-770, 4 figs. Three representative types for inspection and haulage work which were shown at British Empire exhibition.

Engines. See INTERNAL-COMBUSTION ENGINES, Railway Traction Application.

Four-Wheel Drive. Petrol Driven Rail Car with Four-Wheel Drive. Engineering, vol. 118, no. 3076, Dec. 12, 1924, pp. 817-818, 1 fig. Describes truck constructed by Four-Wheel Drive Lorry Co., Slough, Eng., for Norwegian State Rys.

Gasoline. Canadian National High Power Motor Coach. Ry. Age, vol. 76, no. 5, Feb. 2, 1924, pp. 329-330, 4 figs. Seats 55 passengers; driven

by 225-hp. Sterling motor; built by Nat. Steel Car Corpn.

Gasoline Motor Coaches, Missouri Pacific R. R. Ry. Rev., vol. 75, no. 9, Aug. 30, 1924, pp. 307-310, 4 figs. Three new gasoline motor coaches built by J. G. Brill Co., Phila., Pa., for Missouri Pacific Ry. are of model 55 combination type having passenger and baggage compartments and are being used in districts where passenger traffic is light.

Gasoline Railroad Cars, W. L. Bean. New York R. R. Club—Proc., vol. 34, no. 8, Sept. 19, 1924, pp. 7345-7357 and (discussion) 7357-7359, 6 figs Factors of design of cars for branches of trunk lines and for short-line roads.

New Swedish Rail Cars (Neue Autotriebwagen für Schweden), Breuer. Glasers Annalen, vol. 94, no. 10, May 15, 1924, pp. 133-134, 2 figs. One-man cars for operation on Swedish railways, built in Germany, equipped with Buessing gasoline motors and Jaeger roller bearings, and heated by exhaust gases.

Petrol Rail Car Development. Tramway & Ry. Wld., vol. 55, no. 30, June 19, 1924, pp. 290-293, 8 figs. Describes Brill model no. 55 gasoline rail car; overall length, 43 ft. 5 in.; width over posts, 8 ft. 4 in.; height from rail to top of roof, 10 ft. 5 in.; passenger compartment seats 46; engine is four-cylinder, four-cycle, heavy-duty type, developing 41.8 hp. at 800 r.p.m.

Tests With the De Dion Railway Motor Car on the Pau-Mauleon Line (Essais d'Automotrices à essence (Type De Dion) sur le réseau des Chemins de Fer de Pau-Oloron-Mauléon). Industrie des Tramways, vol. 18, no. 213, Sept. 1924, pp. 333-338, 7 figs. Results of operation of "autorail" cars and conditions necessary for their successful exploitation in localities with small traffic.

The Gasoline Railroad-Car for Branch Lines, W. L. Bean. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 306-310, 7 figs. See also Ry. Age, vol. 77, no. 13, Sept. 27, 1924, pp. 535-539, 6 figs. Discusses principal factors of design. Weight-space and weight-power ratios of prime importance. Transmission systems compared.

Two Unit Gasoline Motor Train. Ry. & Locomotive Eng., vol. 37, no. 7, July 1924, pp. 195-196, 2 figs. Maryland and Delaware Coast Ry. equipping entire system with gasoline motor coaches and freight trucks. First to be put in operation between Queenstown, Md., and Lewes, Del., is two-car all-steel train consisting of motor trailer built by Four Wheel Drive Auto Co.

Two-Unit Motor Train for Mississippi Central. Ry. Elec. Engr., vol. 15, no. 2, Feb. 1924, pp. 43-45, 3 figs. Descriptive of two-car gasoline-driven train, built by Four Wheel Drive Auto Co., Clintonville, Wis., which will operate from Hattiesburg to Beaumont, Miss.; motor unit provides space for baggage and seats for 12 passengers, and trailer seats 34 passengers; electric lighting circuits patterned after standard automobile practice.

Gasoline-Electric. Application of Internal-Combustion Engines to Rail Traction (Applicazione dei motori a combustione interna alla trazione su rotaie), M. Mellini and M. Maggiorelli. Rivista Tecnica delle Ferrovie Italiane, vol. 26, nos. 1-2 and 3, July 15-Aug. 15, and Sept. 15, 1924, pp. 1-17 and 68-83, 22 figs. Discusses substitution of gasoline-electric for steam and its problems, and gives details of design and construction of principal types of railway motor cars, including A. E. G., Berliet, Deutsche Werke, Fiat, Renault, Scemia, Crochat, Sulzer-Brown-Boveri, etc.; also Diesel-steam equipment.

Distinctive Features Involved in New Gas-Electric Motor Rail Car. Ry. Rev., vol. 75, no. 10, Sept. 6, 1924, pp. 343-348, 8 figs. See also Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp. 599-601, 5 figs. Describes gas-electric motor rail car built by Electro-Motive Co. in shops of St. Louis Car Co. having six-cylinder, 175-hp. gasoline engine; discusses power plant, car construction, car body, etc.

Railcar Maintains Steam Train Schedule in Four Month Test. Automotive Industries, vol. 51, no. 10, Sept. 4, 1924, pp. 432-434, 6 figs. Describes powerful car built by Nat. Steel Car Co. for Can. Nat. Rys., operating on main line between Hamilton and Toronto, Canada. Designed primarily for carrying passengers, with baggage as a secondary consideration; all-steel construction; length, 55 ft. 9½ in.; width, 8 ft. 9 in.; floor height above rails, 3 ft. 9 5/8 in.; drives through mechanical gearing to one axle of each truck.

The Gas-Electric Motor Car Is Reinstated. Ry. Elec. Engr., vol. 15, no. 9, Sept. 1924, pp. 289-291, 5 figs. Also Ry. Age, vol. 77, no. 9, Aug. 30, 1924, pp. 371-378, 4 figs. No. Pacific & Chicago Great Western will use newly developed type of passenger car; cars are driven by 175-hp. gasoline engine, direct connected to 110-kw. 700-volt generator which supplies power to two railway motors mounted on power truck. Car weighs 35 tons and seats 59 persons.

The Gasoline-Electric Car, A. H. Candee. Elec. Jl., vol. 21, no. 10, Oct. 1924, pp. 481-483, 4 figs. Possibilities and developments.

German. Railway Motor Cars. Eng. Progress, vol. 5, no. 1, Jan. 1924, pp. 18-20, 4 figs. Cars designed by German Gen. Elec. Co. (AEG) in conjunction with Nat. Automobile Co. (NAG), Berlin, having 6-cylinder, 4-cycle engine with output of 50 to 75 hp. at 950 r.p.m.; advantages claimed for cars.

Holland. Railway Motor Car for the Dutch Railways (Ein Eisenbahn-Triebwagen für die holländischen Bahnen), P. Friedmann. Verkehrstechnik, vol. 41, no. 49, Dec. 5, 1924, pp. 633-637, 7 figs. Particulars of motor car built by Hanover A. G., with purely mechanical transmission; 100-hp. Daimler engine of 150 mm. bore and 170 mm. stroke.

Hydraulic-Drive. Gasoline Passenger Car with Hydraulic Drive. Ry. Age, vol. 76, no. 31, June 14, 1924, pp. 1507-1509, 5 figs. Combination passenger and baggage unit car propelled by 150-hp. Ricardo engine through transmission consisting of one hydraulic variable-delivery pump and two hydraulic variable-speed motors; in operation on New York, New Haven & Hartford.

Self-Propelled Passenger Car on N. Y., N. H. & H. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 534-537, 5 figs. Describes combination passenger and baggage unit car, propelled by a 150-hp. Ricardo engine, through a transmission consisting of one Universal hydraulic variable-delivery pump, supplying oil to two Universal hydraulic variable-speed motors, one mounted on each truck frame.

Improvements. Improvements in Motor Car Design, H. Dubath. Elec. Ry. Jl., vol. 64, no. 7, Aug. 16, 1924, pp. 251-253. Trends in design of electric-railway rolling stock considered from standpoints of first cost and maintenance; bodies, running gear, ball and roller bearings, brakes and other parts discussed. Abstract of paper read before Union Internationale de Tramways, de Chemins de fer d'Intêrêt local et de Transports Publics Automobiles.

Inspection. A Motor Railway Inspection Car. Engineer, vol. 137, no. 3560, Mar. 21, 1924, pp. 315-316, 4 figs. Describes new type of motor railway inspection car ordered for use on Rho-

desian Railways, and built at works of Clayton Wagons, Ltd.

Italy. Italians Build Railcars to Meet Motor Bus Competition, F. A. Shepley. Automotive Industries, vol. 50, no. 25, June 19, 1924, pp. 1319-1320, 1 fig. Fitted with two 60-hp. engines, Westinghouse electrical equipment and air brakes; gear sets used provide four forward and reverse speeds of which maximum is 32 m.p.h.

Mack Truck. Mack Builds Railcar Which Will Make Railroad Coaches Convertible. Automotive Industries, vol. 50, no. 18, May 1, 1924, pp. 974-976, 6 figs. Develops electropneumatic remote control system which makes possible train of two or more cars operated by one crew; equal speeds in both directions attained; drive on each axle.

Motorized Passenger Coach. Gasoline Motorized Passenger Coach Minnesota Dakota & Western Ry. Ry. Rev., vol. 74, no. 21, May 24, 1924, pp. 934-935, 3 figs. Gasoline motor power equipment which may be applied to existing passenger coaches, accomplishing their conversion to efficient type of motor car.

Operation. Motor Rail-Cars, J. W. Cain. Soc. Automotive Engrs.—Jl., vol. 15, no. 4, Oct. 1924, pp. 317-319. Ascribes limited success of McKeen gasoline-driven car and one of gasoline-electric type that were introduced in early part of present century and were pioneers among self-propelled cars for railway use, to their excessive weight and to engine and transmission troubles. Present state of industry. Advantages of motorization.

Producer-Gas. Suction-Gas Motor Cars (Saug-gas-Triebwagen), D. Fleck. Verkehrstechnik, no. 27, July 4, 1924, pp. 279-284, 5 figs. Details of tests on line Vorwohle-Emmenthal with suction gas and with benzol drive; consumption of anthracite 1 kg. per 1 km., cost per km. was M.O.14 to M.O.20 for suction gas with benzol addition and benzol.

Rhodesian Railways. Rail Motor-Cars for the Rhodesian Railways. Ry. Gaz., vol. 41, no. 5, Aug. 1, 1924, pp. 146-148, 2 figs. New type rail motor-cars built by Clayton Wagons, Ltd., designed for service in tropical climate at altitudes varying up to 5000 ft. above sea level and maintains speed of 45 m.p.h. on level in calm weather at highest altitude with full load of passengers. Dorman engine has four cylinders, water-cooled, 95 mm. bore by 140 mm. stroke developing 25 b.hp. at 1000 r.p.m.

Specifications. American Gasoline Rail Car Specifications. Motor Transport (N. Y.), vol. 29, no. 12, Jan. 15, 1924, pp. 418-419. Specifications of different makes.

Steam. The "Sentinel-Cammell" Steam Rail Coach in Service. Ry. Gaz., vol. 40, no. 9, Feb. 29, 1924, pp. 277-279, 7 figs. Results of a demonstration carried out in system of Jersey Rys. & Tramways Co. on Feb. 20, 1924. Economies effected since its introduction.

Twin-Motor. Twin Motor Rail Car for the Burlington. Ry. Age, vol. 77, no. 23, Dec. 6, 1924, pp. 1013-1015, 4 figs. Independent power units on trucks permit economical operation under varying conditions.

Types. Motor Coaches for Railways, G. Soberski. Eng. Progress, vol. 5, no. 9, Sept. 1924, pp. 175-182, 23 figs. Development of railway motor cars; modern types—their advantages and disadvantages.

RAILWAY OPERATION

Branch Lines. Unprofitable Branch Railways. S. African Power Engr., vol. 9, no. 79, Nov. 1924, pp. 15, 17, and 19. Review of most recent development in locomotive equipment, with object of reducing working costs over unprofitable railway routes.

Car Switching. Switching Devices (Hilfsmittel zum Verschieben), Wernekke. Fördertechnik u. Frachtverkehr, vol. 17, no. 8, Apr. 30, 1924, pp. 103-105, 6 figs. Various devices for switching railway cars by means of wire ropes; for use in cases where use of switching locomotives would not be economical. Types of electric motors and controllers for devices.

Cinders Disposal. Report on the Handling and Disposing of Cinders. Ry. Eng. & Maintenance, vol. 20, no. 10, Oct. 1924, pp. 402-404. Discusses track layout and equipment for wasting; committee recommends more extensive use of cinders as ballast; equipment for handling direct from pit to point of use; storage of cinders. Committee report of Roadmasters & Maintenance of Way Assn.

Cost Control. Cost Control for the Mechanical Department, G. W. Armstrong. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 459-463, 2 figs. Cost knowledge and production control bring about improvement in railroad operating costs.

Cost Index. A "Cost-of-Living" Index for Steam Railroads, J. C. Hooker. Jl. of Accountancy, vol. 38, no. 1, July 1924, pp. 22-30. Discusses base for railroad cost index, sources and specific character of data and railroad "cost of living" index compared with Department of Labor food index.

Employees-Management Coöperation. Practical Method of Securing Co-operation. Ry. Age, vol. 77, no. 11, Sept. 13, 1924, pp. 453-456. Underlying principles of method in effect on Pennsylvania Railroad System for bringing about co-operation between management and employees, and manner in which it operates.

Unions Essential in Any Co-operation Program, G. Soule. Ry. Age, vol. 77, no. 10, Sept. 6, 1924, pp. 411-412. Fundamentals between coöperation and employees. Shows that coöperation implies mutual education, not merely instruction for employees.

Express-Train Resistance. The Resistance for Express Trains, C. F. D. Marshall. Ry. Engr., vol. 45, no. 531, Apr. 1924, pp. 133-137, 3 figs. Natural wind; effect of direct wind; effect of wind gusts on frontal pressure; limiting speeds.

Forecasting Traffic. Forecasting Future Volume of Railway Traffic, L. E. Peabody. Ry. Age, vol. 76, no. 18, Apr. 5, 1924, pp. 899-900. Consideration of Blood's formula is said to lead to estimates that are too large; original article by J. B. Blood was printed in same journal (Feb. 9, 1923, p. 369).

Freight Handling. See FREIGHT HANDLING.

Freight Rolling Stock Distribution and Control. Increasing the Mobility of Freight Rolling-Stock. Ry. Gaz., vol. 40, no. 11, Mar. 14, 1924, pp. 363-374, 19 figs. Lond. & North East. Ry. now control distribution of whole of their freight rolling stock from a central control office at York, working through 24 district superintendents' offices and 120 sub-control stations. Explains means by which economy in wagon movement is effected and mobility of freight rolling stock increased.

Freight-Train Delays, Cost of. What Is Cost of Freight Delays?. Ry. Age, vol. 76, no. 19, Apr. 12, 1924, pp. 925-926. Committee of signal section, Am. Ry. Assn., analyzes charges and fixes average at $21.07 per hr.

Freight-Train Loading. Maximum Loading of Freight Trains. Ry. & Locomotive Eng., vol. 37, no. 9, Sept. 1924, pp. 278-280. Method of computing adjusted tonnage ratings for maximum freight-train loads.

Fuel Economy. Conservation of Fuel in Rail-

way Operation, W. E. Symons. Ry. & Locomotive Eng., vol. 37, no. 2, Feb. 1924, pp. 41-49, 5 figs. Comparison of statistical items of 30 steam railways; hours of time each day trains are earning revenue; locomotive improvements.

Hot-Box Prevention. Maintenance the Key to Hot Box Prevention, M. S. Roberts. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 474-476, 4 figs. Discusses hot-box prevention, regular inspection of journals, bearings, boxes, wedges, etc.

Live-Stock Transportation. Live Stock Traffic on Argentine Railways. Ry. Gaz., vol. 41, no. 4, July 25, 1924, pp. 115-119, 10 figs. Study of Argentine live stock industry in general and of methods adopted by all great railways in dealing therewith. Discusses live stock traffic by rail, transport conditions, booking traffic and wagon supply, loading animals, despatch formalities and facilities in Buenos Ayres.

Loaded-Car Movement Delays. Some Causes of Delay to Loaded Car Movement, R. A. Munsch. Ry. Rev., vol. 74, no. 15, Apr. 12, 1924, pp. 681-683. Analyzes delays for which shipper is primarily responsible and those for which agent is responsible.

Loading Rules. Report of Committee on Loading Rules. Ry. Age (Daily Edition), vol. 76 no. 35, June 18, 1924, pp. 1684-1686, 2 figs. Rules formulated by committee and presented before Am. Ry. Assn.

Passenger-Train Handling. The Smooth Handling of Passenger Trains, E. R. Boa. Central Ry. Club—Proc., vol. 32, no. 4, Sept. 1924, pp. 1605-1609 and (discussion) 1609-1627. Discusses phases that are contributing factors and outlines manner in which air brake, throttle and reverse gear should be manipulated to insure smooth train handling.

Paulista Ry., Brazil. Electric Operation of Paulista Railway in Brazil, G. Bellows. Ry. Elec. Engr., vol. 15, no. 4, Apr. 1924, pp. 107-109, 6 figs. Electrification of section between Jundiahy and Campinas where wood and imported coal is used for fuel shows large savings. Service requirements, locomotive performance, and costs.

Personnel Work. How to Start Personnel Work on a Railroad, J. C. Clark. Ry. Age, vol. 76, no. 15, Mar. 15, 1924, pp. 745-746. Brief outline of various steps which must be taken to develop more efficient organization.

Point Operation and Control. Point Operation at Marshalling Yards. Ry. Gaz., vol. 40, no. 5, Feb. 1, 1924, pp. 137-143, 11 figs. Description of Aster electrical equipment installed at yards of Northern Railway of France, which insures rapid and economical shunting movements.

Psychology in. Psychology in Railway Operation (Ueber Psychologie und Eisenbahnwesen), K. Marbe. Archiv für Eisenbahnwesen, no. 5, Sept.-Oct. 1924, pp. 729-744. Paper read before psycho-technic committee of German Railways, discussing psychology in relation to train operation; accident prevention, change in work to relieve monotony; etc.

Radio Reception on Trains. See RADIOTELEGRAPHY, Trains.

Signaling. See RAILWAY SIGNALING.

Snow Fighting. How the Illinois Central Fights Snow in a Large Terminal, J. J. Desmond. Ry. Eng. & Maintenance, vol. 20, no. 12, Dec. 1924, pp. 483-486, 4 figs. Preparations which are made in advance to meet winter storms.

Statistics, 1923. Railway Statistics for Nineteen Twenty-three, J. H. Parmelee. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 46-49, 3 figs. Summary of achievement; new equipment; record freight traffic; operating efficiency; financial results; operating revenues; employees and their wages.

Report Shows Improved Railroad Performance. Ry. Age, vol. 77, no. 7, Aug. 16, 1924, pp. 299-302, 4 figs. National Industrial Conference Board studies increased utilization of labor in train service.

Steep Gradients. Railway Operation on Steep Gradient with Rack Engines as Adhesive Engines (Der Eisenbahnbetrieb auf Steilrampen mit Zahnrad- oder Reibungs-Lokomotiven), M. Nordmann. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, nos. 4 and 5, Apr. 15, and May 15, 1924, pp. 70-74 and 93-103, 2 figs. Discusses development of racks and rack engines, substitution of adhesive engines and their development. Details of tests with both types of locomotives.

Stopping and Starting Trains. Estimated Cost of Stopping and Starting Trains, O. O. Carr. Ry. Rev., vol. 74, no. 18, May 3, 1924, pp. 807-808. Tables giving estimated additional costs to stop and start trains.

Storerooms. Storeroom Improvements at Richmond Save Time and Money, J. Y. Bayliss. Elec. Ry. Jl., vol. 64, no. 21, Nov. 22, 1924, pp. 875-878, 12 figs. Details of stock-book systems adopted by Va. Ry. & Power Co. in one of its large storerooms. Installation involved changes in making and keeping record of stock and complete rearrangement of stock itself. Cost of installation $5400.

Switching. Switching Service for Railway Cars (Verschiebeanlagen für Eisenbahnwagen), R. Hänchen. Maschinenbau, vol. 3, no. 23, Sept. 11, 1924, pp. 852-857, 16 figs. Discusses switching methods and devices, including capstans, winches, endless rope device, and their operation.

Time Tables. Instructions for Determining the Schedule Times for Trains by the Graphic Method (Anweisungen für die Ermittlung der Fahrzeiten der Züge nach dem zeichnerischen Verfahren), M. Dittmann. Organ für die Fortschritte des Eisenbahnwesens), vol. 79, no. 6, June 15, 1924, pp. 117-129, 8 figs. Gives details of five different methods for given line and given locomotive and weight of train.

The Making of Time Tables and Some of Its Difficulties, T. Connell. Elec. Traction, vol. 20, no. 2, Feb. 1924, pp. 64-67, 5 figs. How it is done by Boston Elevated Ry.

Train Control. A Bibliography of Train Control. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 100-101. References to various articles published on developments and tests of train-control devices.

A Continuous Conductive System of Train Control. Ry. Rev., vol. 75, no. 14, Oct. 4, 1924, pp. 501-504, 1 fig. Clifford system of automatic train control gives continuous indication two blocks in advance of danger condition.

An Unusual Idea in Automatic Train Control. Ry. Rev., vol. 74, no. 16, Apr. 19, 1924, pp. 723-731, 14 figs. Describes train-control system of Indiana Equipment Corpn., designed and developed by C. F. Shadle, which is of the ramp or direct-contact type. Essential parts of device consist of wayside ramp, contact shoe having roller contact, neutral control relay, electro-pneumatic valve, automatic air-brake valve, and speed controller.

Automatic Cut-Off Control Tested in Service. Ry. Age, vol. 76, no. 21, Apr. 26, 1924, pp. 1033-1037, 9 figs. Describes control device and tells what its performance on two railroads has demonstrated.

Automatic Train-Control—Its Development and Status. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, pp. 390-394, 4 figs. Types of automatic

apparatus to stop trains or to lower speed being installed by railroads under current order of Interstate Commerce Commission.

Automatic Train Control on Missouri Pacific Ry. Ry. Rev., vol. 75, no. 21, Nov. 22, 1924, pp. 829-834, 8 figs. First installation ever made of automatic train control superimposed on controlled manual block.

Economic Advantages of Automatic Train Control, Jos. Beaumont. Ry. Rev., vol. 75, no. 14, Oct. 4, 1924, pp. 507-508. Information on direct saving which accrued by elimination of train stops on Chicago Rock, Island & Pac. Ry.; analysis of economic value of automatic train control.

G. R. S. Train Control Demonstrated on C. & N. W. Ry. Elec. Engr., vol. 15, no. 1, Jan. 1924, pp. 25-26, 6 figs. Results of actual service test made by Chicago & North West. between West Chicago, Ill., and Forris (Elgin), showing practicability of Gen. Ry. Signal Co.'s system of intermittent inductive tapered train control.

Hearing on Automatic Train Control at Washington. Ry. Rev., vol. 74, nos. 20 and 21, May 17 and 24, 1924, pp. 888-889 and 893-896, and 927-929 and 933-934. See also Ry. Age, vol. 76, nos. 23 and 25, May 10 and 24, 1924, pp. 1145-1148 and 1255-1258. Testimony of railroads, signal engineers, and representatives of manufacturers before Interstate Commerce Commission.

Making Brake Tests for Train Control, C. B. Miles. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 98-100, 4 figs. Relation of air brake to signal engineering from standpoint of air-brake engineer. Methods of making tests.

Miller Train Control Stop and Speed Equipment. Ry. Elec. Engr., vol. 15, no. 1, Jan. 1924, pp. 17-19, 3 figs. Describes equipment as in service on Chicago & Eastern Illinois; pneumatic manual release positive stop valve to be mounted outside locomotive cab, and reversing mechanism to give proper protection for either forward or backward movements among recent developments.

New Design of Brookins Train Control. Ry. Signaling, vol. 17, no. 6, June 1924, pp. 247-249, 7 figs. Features normally raised descending-type and flexible brush contact.

Pennsylvania's Experience with Automatic Stops, A. H. Rudd. Ry. Age, vol. 77, no. 15, Oct. 11, 1924, pp. 645-646. See also Ry. Signaling, vol. 17, no. 10, Oct. 1924, pp. 391-393; and Ry. Rev., vol. 75, no. 18, Nov. 1, 1924, pp. 654-657. Value of cab signal; effect on track capacity; conclusions. (Abstract.) Paper read before Am. Ry. Assn.

Progress on Automatic Train Control. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 75-76. Résumé of what has been accomplished to date, and prospect for 1924.

Service Tests of Automatic Cut-Off Control. Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 267-272, 12 figs. Describes control device; what its performance on two railroads has demonstrated.

Study of Train Control Brought Up-to-Date. Ry. Age, vol. 77, no. 16, Oct. 18, 1924, pp. 687-693. Abstracts of following papers presented before Am. Ry. Assn.: Development of Ramp Type on the C. & O., B. T. Anderson; Miller Train Control on the C. & E. I., H. H. Orr; Regan System on 165 Miles, L. Wyant; Development and Tests on U. P. Lines, A. H. McKeen; reference to other train-control papers.

The Union Continuous Train Control Systems. Ry. Age, vol. 77, no. 10, Sept. 6, 1924, pp. 413-416, 2 figs. Automatic train control developed by Union Switch & Signal Co. as being installed on Atchison, Topeka & Santa Fe between Chicago and Shopton, Ia., provides engineman with a continuously-visible indicator on his locomotive from which he can at all times determine at what speed it is permissible to run. Development and operation of two-speed and three-speed apparatus.

Train Control Company Improves Air Apparatus. Ry. Elec. Engr., vol. 15, no. 3, Mar. 1924, pp. 81-83, 3 figs. Description of functions of the different pieces of pneumatic apparatus in train control system of Indiana Equipment Corpn., of Indianapolis, Ind.; develops valves to give graduated reduction of brake-pipe pressure.

Train Control Development on the C. & O., B. T. Anderson. Ry. Signaling, vol. 17, no. 10, Oct. 1924, pp. 394-397. Features of first installation; new features of system; failure of automatic-train-control devices; train-control organization; effect on track capacity; interchangeability.

Train Control in Service on the Rock Island. Ry. Elec. Engr., vol. 15, no. 1, Jan. 1924, pp. 5-10, 5 figs. See also Ry. Signaling, vol. 17, no. 1, Jan. 1924, pp. 9-13, 5 figs. Describes Regan Safety Devices Co. automatic train-control system, intermittent ramp contact type, with speed control, installed on double track main line of Chicago Rock Island & Pacific, between Blue Island (Chicago), Ill., and Rock Island, in compliance with Interstate Commerce Commission's order.

Train Control Test Engine on the U. P. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 102-103, 5 figs. Describes equipment of locomotive fitted by Union Pacific with three types of control equipment to determine device best suited to its conditions; installation made so that locomotive could be operated over adjacent territory on which the three types of road apparatus were installed.

Train Operation with Automatic Control, C. & O. Ry. Ry. Rev., vol. 74, no. 10, Mar. 8, 1924, pp. 449-461, 25 figs. Describes automatic train control, and signal system, both operated by alternating current; signals are three-indication color light automatic block signals of absolute-permissive type.

Wrecks Preventable by Train Control, G. E. Ellis. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 478-481. Analysis of statistics to show that only few accidents can be eliminated automatically.

See also RAILWAY SIGNALING, Controlled Manual Block.

Train Despatching. Modern Methods in Train Dispatching, J. C. Latham. Elec. Communication, vol. 3, no. 1, July 1924, pp. 57-68, 13 figs. Describes Western Electric selector, consisting of a simple electromagnetically operated stepping mechanism which permits calling of any station without affecting others; portable telephones supplied to crews of passenger and freight trains; describes selector train-despatching system on railroads in different parts of world.

Movement of Trains in a Railway System (La circulation des trains sur un grand réseau ferré), M. Bouvet. Technique Moderne, vol. 16, nos. 18 and 19, Sept. 15 and Oct. 1, 1924, pp. 597-603 and 633-644, 46 figs. Describes modern devices and arrangements for assuring regular running and safety of trains, particularly block systems.

Recent Developments in Telephone Train Dispatching Circuits, Wm. H. Capen. Ry. Signaling, vol. 17, no. 6, June 1924, pp. 253-256, 15 figs. Line-transmission equipment, train-despatching circuits and location of apparatus. (Abstract.) Paper presented before Telegraph and Telephone Section, Am. Ry. Assn.

The "Dispatching System" by Telephone on the Belgian State Railways, H. De Caesstecker. Int. Ry. Congress Assn.—Bul., vol. 6, no. 5, May 1924, pp. 331-395, 20 figs. New method of controlling running and composition of trains. Lines on which "dispatching system" is already in operation or on which its adoption has been decided upon or is under consideration; administrative organization of system; choice of staff; financial results.

Train Loads, Maximum. Maximum Train Loads. Ry. Rev., vol. 75, no. 6, Aug. 9, 1924, pp. 205-209. Report of committee for purpose of establishing quick and practicable method of adjusting tonnage ratings for various locomotives under different conditions of grade and alignment.

Work Trains. Report on Operation of Work Trains. Ry. Rev., vol. 75, no. 16, Oct. 18, 1924, pp. 575-577. When to eliminate and how to get greatest efficiency under varying conditions. Report of committee presented before Roadmasters' & Maintenance of Way Assn.

RAILWAY REPAIR SHOPS

Birmingham, Ala. Southern's New Shops Have Efficient Layout. Ry. Age, vol. 77, no. 26, Dec. 27, 1924, pp. 1159-1164, 13 figs. Modern units erected at Birmingham, Ala., for handling locomotive and car repairs; electrically driven equipment used practically throughout.

Box Cars, Rebuilding. Time Record in Rebuilding Box Cars, A. C. L. R. R., O. A. Wallace. Ry. Rev., vol. 75, no. 15, Oct. 11, 1924, pp. 533-537, 13 figs. Voluntary contest originated in four system shops demonstrates advantages obtained in progressive repair system.

Car-Repair Billing. A. R. A. Car Repair Billing, B. F. Jamison. Ry. Mech. Engr., vol. 98, no. 10, Oct. 1924, pp 610-613. Points out possibilities of individual roads saving, and conversely losing, probably millions of dollars depending upon whether or not they handle A. R. A. billing in a systematic manner in accordance with rules, employing constant checks of all kinds to maintain accuracy of work. Requirements of the various persons who have responsibility of executing system of car-repair billing. Handling of accident reports. Abstract of paper read before Chief Interchange Car Inspectors' and Car Foremen's Assn. of Am.

Car Repairs. A Constructive Study of Railroad Car Repairs. Ry. Rev., vol. 74, no. 23, June 7, 1924, pp. 989-999, 14 figs. Results of extended investigation of actual facilities with view to suggestions for introduction of economies and elimination of losses.

Car-Scheduling System. Systematic Car Repair Work at Kent, Ohio, G. W. Armstrong. Ry. Rev., vol. 74, no. 3, Jan. 19, 1924, pp. 133-136, 8 figs. Description of system of scheduling car repair work in Kent, Ohio, car shops of Erie Ry.

Car Work, Planning. See INDUSTRIAL MANAGEMENT, Planning.

Chicago, Burlington & Quincy R. R. Burlington's New Shops Greatly Increase Facilities. Ry. Rev., vol. 74, no. 1, Jan. 5, 1924, pp. 64-73, 17 figs. See also Ry. Jl., vol. 30, no. 1, Jan. 1924, pp. 22-26, 8 figs. Chicago, Burlington & Quincy R. R. has constructed a $3,000,000 repair plant at Utah Junction, near Denver, Col., to care for all heavy repairs on its western lines as well as for those of Colorado & Southern. Describes principal buildings erected as a preliminary unit, viz., machine and erecting shop, boiler shop, blacksmith shop, power plant, storehouse, and oil house, all of which are of most modern construction.

Cost-Reducing Equipment. Cutting Costs in the Soo Line Repair Shops, H. Campbell. Am. Mach., vol. 60, no. 2, Jan. 10, 1924, pp. 37-40, 14 figs. Special tools for saving time; quantity production in tool room; slotting attachment; punching holes in staybolts.

Delivery System. Transportation of Material in the Roanoke Shops, Jas. M. Thomas. Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1126-1130, 9 figs. Describes delivery system of shops of Norfolk & West. Ry.; how materials are delivered to and from shops and yards; organization and system; schedules maintained and equipment used.

Design. Report on Design of Shops and Engine Terminals. Ry. Age, vol. 76, no. 30, June 13, 1924, pp. 1464-1468. Seven specific recommendations for freight-car and repair shops. Am. Ry. Assn. committee report and discussion.

Driving-Rod Repairs. Modern Practice in Driving Rod Repairs. Ry. Rev., vol. 75, no. 7, Aug. 16, 1924, pp. 236-244, 23 figs. Describes methods employed in various shops for manufacturing new rods, using some of the more modern machines, in connection with other practices following in repairing driving rods; installations of modern shop equipment tend to simplify maintenance operations.

Drypipes. The Inside and Outside Drypipe. Ry. & Locomotive Eng., vol. 37, no. 9, Sept. 1924, pp. 261-264, 6 figs. Describes method of repairing drypipe leakage.

Freight-Car. New Car Repair Facilities for the D. & R. G. W. Ry. Mech. Engr., vol. 98, no. 9, Sept. 1924, pp. 540-546, 21 figs. Describes modern shops of Denver & Rio Grande Western for repairing wood and steel freight cars. Organized with station-to-station method and balanced gangs. Methods of repairing.

Grand Rapids, Mich. How the Grand Rapids Shops were Modernized. Ry. Age, vol. 76, no. 31, June 14, 1924, pp. 1497-1502, 9 figs. See also Ry. Rev., vol. 74, no. 24, June 14, 1924, pp. 1108-1119, 16 figs. Details of reconstruction of general repair shops of Pere Marquette plant; method of handling locomotive repairs; improved arrangement of car-repair shops; power plant.

Locomotive. Albuquerque Shops of the Santa Fé, H. Campbell. Am. Mach., vol. 60, nos. 22 and 23, May 29 and June 5, 1924, pp. 799-801 and 847-850, 21 figs. Buildings and equipment of new shops of A. T. & S. F. R. R.; machinery grouped according to sequence-of-work plan; details of operation; scientific tool grinding by expert; equipment for tire and axle jobs; grinding; brazing equipment.

Classification of Locomotive Repair Shops, Geo. Armstrong. Ry. Mech. Engr., vol. 98, no. 1, Jan. 1924, pp. 41-46, 3 figs. Analysis of shop operations with object of reducing expenses and facilitating repairs.

Erie Completes Modern Addition to Hornell Shop. Ry. Age, vol. 76, no. 2, Jan. 12, 1924, pp. 181-185, 10 figs. Gap crane of 250 tons capacity comprises interesting feature of development.

Locomotive Repairs in New Burlington-Denver Shops, H. Campbell. Am. Mach., vol. 61, nos. 12 and 14, Sept. 18 and Oct. 2, 1924, pp. 447-450 and 531-533, 19 figs. New shops of C. B. & Q R. R. near Utah Junction, Denver, Col., now in operation. Time-saving and cost-lowering tools and fixtures. Details as to special tools and methods.

Locomotive Shops Reconstructed on D. & R. G. W. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 491-496, 9 figs. Program includes additions to general repair plants at Denver and Salt Lake City.

Welding Standardization in Locomotive Shops,

J. S. Heaton. Ry. Mech. Engr., vol. 98, nos. 3 and 4, Mar. and Apr. 1924, pp. 176-178 and 231-234, 5 figs. Review of the various methods used on boilers, fireboxes, running gear, cylinders and reclamation work; proper care of equipment.

Locomotive-Boiler. See LOCOMOTIVE BOILERS, Repair Shop.

London Underground Railways. The Acton Works of the Underground Railways. Engineer, vol. 137, no. 3555, Feb. 15, 1924, pp. 172-174, 8 figs., partly on p. 176. See also Ry. Gaz., vol. 40, no. 7, Feb. 15, 1924, pp. 195-202, 18 figs.; and Engineering, vol. 117, nos. 3033 and 3034, Feb. 15 and 22, 1924, pp. 195-202, and 229-234 and 240, 53 figs., partly on p. 208 and supp. plate. Details of central repair shop which will eventually serve for overhauling of rolling stock belonging to Metro. District, London Elec. & City and South and Central London railways.

Machine Tools and Methods. Southern Pacific Repairs, H. Campbell. Am. Mach., vol. 60, no. 24, June 12, 1924, pp. 869-872, 14 figs. Saving time and work by use of air cylinders; ball-bearing roller tools; friction chuck for taps and reamers; turning lift shafts; other tools employed in repair shop at Houston, Tex.

Methods and Equipment. C. B. & Q. Shops at West Burlington, H. Campbell. Am. Mach., vol. 61, nos. 24 and 26, Dec. 11 and 25, 1924, pp. 905-909 and 989-992, and vol. 62, no. 1, Jan. 1, 1925, pp. 3-5, 33 figs. Time-saving methods and equipment in well-organized railway shops; group system of layout used; flue-shop layout and methods.

Organization. B. R. & P. Has Well Organized Production Shop (Du Bois, Pa.). Ry. Mech. Engr., vol. 98, no. 5, May 1924, pp. 295-299, 6 figs. Limited program of repairs facilitates efficient operation; routing of locomotives and parts; department organization and machine-tool operation; shop organization.

Steel Cars. Pennsylvania Builds Modern Steel Car Shops. Ry. Age, vol. 76, no. 22, May 3, 1924, pp. 1085-1088, 9 figs. Duplicate designs erected at Pitcairn and Enola to handle heavy repairs on Eastern and Central regions; capacity of each shop is 33 cars a day; each car-repair unit consists of rivet-cutting shed housing 8 cars at a time, repair shop with 36 tear-down and 18 set-up positions, combined storeroom, office and welfare building.

Street-Car. Repair Shops at Bathurst St., Toronto. Can. Engr., vol. 46, no. 1, Jan. 1, 1924, pp. 101-104, 5 figs. Description of new shops being built at Hillcrest by Toronto Transportation Commission; plant includes repair, assembly and subsidiary shops, large stores building, boiler house, office building, etc.

Shop and Storage for Eighth Avenue Road. Elec. Ry. Jl., vol. 63, no. 22, May 31, 1924, pp. 849-852, 7 figs. New York City line rebuilds old foundry for repair and inspection shops, at 155th Street and Eighth Ave.; storage yard for cars is without special trackwork on account of expensive conduit construction; transfer tables used as substitute; new type of slot track construction.

RAILWAY SHOPS

Blacksmith Shop. A Visit to a Well Organized Railroad Blacksmith Shop. Ry. Rev., vol. 75, nos. 8 and 10, Aug. 23 and Sept. 6, 1924, pp. 271-277 and 355-361, 28 figs. Study of equipment and activities in blacksmith shop of So. Louisville shops of Louisville & Nashville Ry.; equipment grouping and characteristic planning methods introduced.

Car-Building. Car Building Program in a Railroad Shop. Ry. Rev., vol. 74, no. 25, June 21, 1924, pp. 1177-1185, 19 figs. Describes production activities introduced in new Wyoming car shops of Pere Marquette Ry. at Grand Rapids, Mich., where 300 refrigerator cars are being built after production schedule at rate of 2½ cars per day.

Delivery of Material. Store Delivery of Material to Users at Shops, J. E. Peery. Ry. Rev., vol. 75, no. 5, Aug. 2, 1924, pp. 155-159, 5 figs. Results obtained on Southern Pacific system indicate possibilities of substantial savings through this service.

Design. Design of Shops and Locomotive Terminals Committee's Report. Can. Ry. & Mar. Wld., no. 317, July 1924, pp. 326-327. Report of Am. Ry. Assn. committee; recommended practice.

Some Questions in Modern Shop Design, E. Wanamaker. Ry. Mech. Engr., vol. 98, no. 8, Aug. 1924, pp. 486-488. Flexibility of arrangement with view to probable future expansion is important consideration.

Equipment Standardization. Standardized Shop Work at Topeka, F. H. Colvin. Am. Mach., vol. 61, no. 2, July 10, 1924, pp. 63-64, 1 fig. Outline of how equipment is standardized and manufactured at Topeka shops of Santa Fe, and economies effected by standardization.

Inspection Shops. Modern Inspection Facilities for the Interborough System. Elec. Ry. Jl., vol. 64, no. 9, Aug. 30, 1924, pp. 305-308, 6 figs. Describes two of six storage yards and inspection buildings being built by City of New York to provide for 2266 cars of Interborough Rapid Transit system.

Labor-Saving Devices. Devices Used in a Southern Pacific Shop, H. Campbell. Am. Mach., vol. 61, no. 11, Sept. 11, 1924, pp. 415-418, 13 figs. Details of labor-saving devices at El Paso shops of Southern Pacific Ry.

Lighting. Illumination of Railroad Shops and Roundhouses. Ry. Rev., vol. 75, no. 23, Dec. 6, 1924, pp. 915-919, 7 figs. Recommendations and standard practice to meet requirements of safety and efficiency. (Abstract.) Committee report before Assn. Ry. Elec. Engrs.

Locomotive. Locomotive Boiler Work in a Modern British Shop. Eng. Production, vol. 7, no. 140, May 1924, pp. 142-143, 5 figs. Notes on equipment and methods employed at Elswick Works of W. G. Armstrong, Whitworth & Co., Ltd., at Newcastle-on-Tyne.

Reinforced-Concrete Locomotive Works at Jungenthal (Vierschiffige Eisenbetonhalle der Lokomotivfabrik Arn. Jung in Jungenthal bei Siegen), H. Butzer. Deutsche Bauzeitung, vol. 58, no. 76, Sept. 20, 1924, pp. 153-158 (Konstruktion u. Bauausführung), 9 figs. Design and construction of a four-section locomotive works of 7600 sq. m. ground area; traveling crane and other equipment.

Machine Tools, Application of Modern. How Modern Machine Tools Cut Costs. Elec. Ry. Jl., vol. 63, no. 12, Mar. 22, 1924, pp. 444-454, 29 figs. Practices of some shops in application of modern machine tools and methods to electric railway work. How multiple cutting lathes reduce cost of axle machining; improvements in wheel lathes and boring mills; specal machines used in bearing work; etc.

Machine Tools for. See MACHINE TOOLS, Railway-Shop.

Materials Handling in. See MATERIALS HANDLING, Railway Shops.

Power Plant. See STEAM POWER PLANTS, Railway Shops.

Scrap Reclamation. The Disposition of Dis-

carded Material, H. C. Stevens. Ry. Rev., vol 75, no. 3, July 19, 1924, pp. 87-91, 17 figs. Discusses possibilities in reclamation of various items of scrap, by installation of modern labor-saving devices, together with possible savings, if importance of conservation and reclamation is recognized and conceded by placing work under supervision of aggressive, studious, mechanical man with proper material knowledge. Gives some methods employed by Wabash Ry.

The Rolling Mill in the Beech Grove Shops of the Big Four. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 561-563, 3 figs. Account of practice of Cleveland Cincinnati Chicago & St. Louis Ry. in rolling round stock from reclaimed scrap material, at its shops at Beech Grove, Ind. Describes equipment, and force employed in its operation, and gives data as to quality of material produced.

Stores Methods in. Store Methods on the Norfolk & Western, J. W. Wade. Ry. Age, vol. 77, no. 14, Oct. 4, 1924, pp. 605-608, 8 figs. Particulars of new stores-department methods which have brought about a large reduction in material investment.

Tire-Heating Plant. Electric Tyre Heating Plant at the Acton Works of the Metropolitan District Railway Company. Tramway & Ry. World, vol. 55, no. 3, Jan. 17, 1924, pp. 17-19, 6 figs. Comprises two Oerlikon tire heaters, each having rating of 60 kva.; heaters consist of a transformer with a single primary winding. Describes installation and its operation.

Training of Forces. The Training of Shop Supervisory Forces, L. W. Baldwin. Ry. Age (Daily Edition), vol. 76, no. 34, June 17, 1924, pp. 1627-1630. Selection of apprentices; supervision and encouragement of mechanic; selecting men for promotion; duties of foreman; study of new tools and appliances.

Welding in. See OXY-ACETYLENE WELDING, Railway Shops.

Wheel and Axle. An Interesting Wheel and Axle Shop. Ry. Rev., vol. 75, no. 25. Dec. 20. 1924, pp. 977-987, 21 figs. Equipment and methods used for handling wheels and axles in shops of Newport News Shipbldg. & Dry Dock Co., Newport News, Va.; introduction of mechanical materials-handling devices and refinement in present method of machine operation are result of comprehensive study.

RAILWAY SIGNALING

Automatic Block. The Application of Alternating Current Supply With Battery Reserve to Signal Systems, H. G. Morgan. Am. Ry. Assn., Signal Section—Proc., Mar. 1924, pp. 698-705. See also Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 158-160, 1 fig. Discusses use of commercial power for railway signaling with emergency reserve battery; application of floating system on terminals; transmission for systems requiring more power; systems using power for all functions; signals lighted electrically.

The Automatic Block System (Le "block system" automatique), A. Bourgain. Nature, nos. 2638 and 2640, Oct. 25 and Nov. 8, 1924, pp. 262-267 and 293-298, 19 figs. Describes system in force in France; semaphores and colored lights, rail splices, relays for d.c. operation, a.c. automatic-block-system operation, etc.

Automatic, for Grade Crossing. Automatic Signals for a Railroad Grade Crossing. Ry. Age, vol. 76, no. 15, Mar. 15, 1924, pp. 735-738, 3 figs., and Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 165-168, 3 figs. Satisfactory for thin traffic; home and distant signals arranged on "normal danger" plan.

Block. I. C. C. Issues Annual Signal Statistics. Ry. Signaling, vol. 17, no. 11, Nov. 1924, pp. 443-447, 3 figs. Yearly report shows increase of 1471 miles of automatic block during 1923.

Report on A. C. Block Signaling. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 126-128. Report of Am. Ry. Assn. committee on necessary modification of a.c. track circuits in detail or in principle to insure reliable protection of motor buses and motor cars, and availability of rectifiers for signal systems.

Brake-Distance Calculation. Calculating Brake Distance by Chart, C. A. Melhuish. Ry. Signaling, vol. 17, no. 5, May 1924, pp. 204-205, 2 figs. Chart for establishing overlap distances devised according to formulas.

Colored-Light Signals. Canadian National Color-Light Signals, T. A. Allen. Ry. Signaling, vol. 17, no. 7, July 1924, pp. 268-270, 6 figs. Expanded steel trusses in place of bridges save money; main line switches electrically lighted.

Color Light Signals on the I. C., H. G. Morgan. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 469-471, 7 figs. A. c. floating battery and primary battery used on different sections of 109-mi. installation in Kentucky and Tennessee.

New Signals on Burlington Expedite Traffic. Ry. Age, vol. 76, no. 25, May 24, 1924, pp. 1260-1262, 3 figs. Delays reduced from 15 min. to hour by replacing positive block with automatics; color-light automatic signal installation in service between Guernsey, Wyo., and Wendover.

See also Light Signals.

Construction, 1923. Signal Construction Shows Marked Increase, K. E. Kellenberger. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 59-68. Remote-control switch installations grow in favor; statistics on automatic block signals and interlocking plants installed in 1923.

Controlled Manual Block. Controlled Manual Block with Train Control. Ry. Age, vol. 77, no. 19, Nov. 8, 1924, pp. 843-847, 9 figs. See also Ry. Signaling, vol. 17, no. 11, Nov. 1924, pp. 423-428, 12 figs. Missouri Pacific eliminates train orders by directing train movements with signals.

Direct-Current. D. C. Signal Construction on Frisco. Ry. Signaling, vol. 17, no. 11, Nov. 1924, pp. 421-422, 8 figs. Rapid progress and minimum train delay accomplished by systematized distribution of materials.

Report of Committee on D. C. Signaling. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 132-133. Report of Am. Ry. Assn. committee. Instructions for testing resistance of switch circuit controller, shunting circuits and contacts; maximum resistance for switch circuit controllers, shunting circuits and contacts; specification for bonding track circuits.

Double-Wire. The Double-Wire Working of Points and Signals. Ry. Engr., vol. 45, no. 535, Aug. 1924, pp. 283-285, 6 figs. Shows how first cost of signaling and of its subsequent maintenance may be reduced; points and signals are easier to move; signals are compensated when "on" and when "off," and they are definitely restored instead of going "on" by gravity; insures that signals do not stick "off."

Fixed Signals. Fixed Signals, W. H. Elliott. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 907-946, 27 figs. Principles of signaling for lines with dense traffic and for large stations; forms of day and night signals; signal lights; automatic block signals; etc.

Flagging. Why Continue Flagging in Automatic Territory?, J. L. White. Ry. Age, vol. 77, no. 4, July 26, 1924, pp. 149-151. Shows that in automatic-signal territory continued use of flagging rule creates a divided responsibility that causes

collisions; suggests that placing of responsibility squarely on engineman will to a large extent diminish rear-end collisions.

Gaging. Unit System Used for Gaging Signal Maintenance on Northern Pacific, C. A. Christofferson. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 482-483, 1 fig. Application of system to Fargo and Dakota divisions.

Hall System. Transmission by Wire for Long Distances or Under Difficulties and Use of Electric Signals (Note sur les transmissions par fils à longue distance ou difficiles et l'emploi de signaux à moteur). Revue Universelle des Transports, vol. 1, no. 11, Aug. 1, 1924, pp. 171-172, 2 figs. Details of Hall system of working railway signals by means of an electric storage-battery motor.

Increasing Track Capacity by. How Signals Increase Track Capacity. Ry. Signaling, vol. 17, no. 5, May 1924, pp. 198-200. Contest papers, sponsored by this journal, as follows: Increasing Track Capacity by Signaling, Geo. S. Pfasterer; Automatics Help on the I. C., C. W. Shaw; Signaling Delays Double Track on Branch of Pennsylvania, L. L. Banks; Signaling Postponed Heavier Expenditures on N. & W., R. H. Smith; Cash Saving Accomplished by Signals on the B. & O., J. C. Hoffman.

Interlocking. Automatic Interlockings on the G. N. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 475-477, 8 figs. Track-controlled plants without derails, installed by Great Northern, show saving that warrants extensive application of principle.

Low-Voltage Interlocking on C. & N. W., R. M. Phinney. Ry. Signaling, vol. 17, no. 11, Nov. 1924, pp. 429-430, 5 figs. Operator handles junction switch and signals by table levers; simplified locking circuits used.

Mechanical Interlocking. Ry. Engr., vol. 45, no. 536, Sept. 1924, pp. 309-310, 4 figs. Gives diagrams and locking lists of Baker Street and Wembley Park stations on Metropolitan Ry.

New Interlocking Construction Ideas, J. E. Jacobs. Ry. Signaling, vol. 17, no. 7, July 1924, pp. 271-274, 13 figs. Chicago & West. Indiana installs 120-lever plant using parkway cable, unique outlets, and novel charging apparatus.

New Interlocking Plant at Busy Terminal. Ry. Rev., vol. 75, no. 22, Nov. 29, 1924, pp. 861-866, 10 figs. Electro-pneumatic interlocking plant with a.c. control and unusual train-starting system.

New Low-Voltage Interlocking on the Delaware & Hudson, A. H. Rice. Ry. Signaling, vol. 17, no. 10, Oct. 1924, pp. 375-377, 6 figs. Points out that remote control of switches and signals, in connection with new coaling plant, permits high-speed movements.

New Plant on the Pennsylvania, F. A. Beck. Ry. Signaling, vol. 17, no. 5, May 1924, pp. 191-194, 8 figs. Installation of low-pressure electropneumatic interlocking at Aspinwall, Pa., replaces three old mechanical plants at saving of $36,690 per yr.

New Reading Interlocking at Camden, A. H. Yocum. Ry. Signaling, vol. 17, no. 9, Sept. 1924, pp. 338-341, 10 figs. Electropneumatic plant with alternating current control includes unique train starting system; describes tower and machine, alternating-current track circuits, air-line and conduit system, instrument and relay cases, etc.

N. P. Interlocking at Minneapolis, C. A. Christofferson. Ry. Signaling, vol. 17, no. 8, Aug. 1924, pp. 301-302, 7 figs. Floating charge reduces required battery capacity; locking and electric lighting circuits simplfied.

Light Signals. D. C. and A. C. Power for Light Signals, L. S. Dunham. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 113-115. Reliable, economical operation to be derived by different combinations of primary battery and a.c. supply.

115 Miles of Light Signals on Santa Fe, E. Winans. Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 155-157, 8 figs. See also Ry. Age, vol. 76, no. 17, Mar. 29, 1924, pp. 843-844, 2 figs. Electrically lighted switch lamps and pumping-station motor fed from transmission line.

See also Colored-Light Signals.

The Baltimore & Ohio Railroad Company Color Position Light Signals, F. P. Patenall. Int. Ry. Congress Assn.—Bul., vol. 6, no. 12, Dec. 1924, pp. 1156-1160, 1 fig. Explains present system, combination of arms and colored lights, and describes proposed system, color position light signals for both day and night use.

Lock-and-Block System. Electrical Signaling Equipment on Railways, V. Mitchell. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 954-956, 4 figs. Describes evolution of lock-and-block system of signaling and uses of track circuit as now employed on Midland section of Lond., Midland & Scottish Ry.

The "Syx" Improved Electric Lock-and-Block System. Ry. Gaz., vol. 40, no. 7, Feb. 15, 1924, pp. 203-204, 2 figs. Style L, type B apparatus.

Neon, Lamps for. Neon—A New Gas for Electrical Use, C. S. Treacy. Ry. Signaling, vol. 17, no. 7, July 1924, pp. 279-280, 1 fig. Development of new gas and its application to signal lights and lightning arresters.

New York, New Haven & Hartford. Signal Development in Connection with Single Phase Propulsion, W. F. Follett. Ry. Signaling, vol. 17, no. 8, Aug. 1924, pp. 315-319, 4 figs. Discusses alternating-current signaling to meet special characteristics caused by electric operation.

Patents. Railway Signals and Communicating Apparatus. Abridgments of Specifications (Lond.), Class 105, Period 1916-20, 1924, 111 pp. Patents for inventions.

Point Operation, Automatic. Automatic Operation of Railway Points. Ry. Engr., vol. 44, no. 527, Dec. 1923, pp. 473-474, 1 fig. Describes automatic signaling arrangement on Mersey Ry., England, first installation in world where trains make their own point movements; this permits two signal boxes to be closed.

Point Operation, Long-Distance. A New Method for the Long-Distance Operation of Points. Ry. Engr., vol. 45, no. 538, Nov. 1924, pp. 386-388, 4 figs. See also Ry. Gaz., vol. 41, 15, Oct. 10, 1924, pp. 476-478, 4 figs. At Charleville, on Great Southern & Western of Ireland, some facing points are being operated at over a mile from their lever; power is obtained through hand-operated generator, and this is first instance of such means being employed for point and signal operation.

Section Blocks. Separate Service for Section Block Areas (Die getrennte Bedienung der Streckenblockfelder einer Fahrrichtung), H. Möllering. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 5, May 15, 1924, pp. 103-108. Design and operation of Siemens & Halske a.c. system of quadruple block-field type.

Single-Line Switching-Out. Switching-Out Single-Line Token Instruments. Ry. Gaz., vol. 40, no. 4, Jan. 25, 1924, pp. 107-110, 6 figs. Describes simple means by which any number of intermediate single-line token stations may be switched out at times when traffic is light, and indicates in particular, how this has been effected on Lond. Midland & Scottish Ry.

Single-Track. Single Track Signaling on C. B. & Q. Ry. Signaling, vol. 17, no. 6, June 1924, pp. 230-233, 9 figs. Delco generator used as power source for a.c. floating system; unique control for tunnel protection.

Storage-Battery Maintenance and Operation. Report of Committee on Instruction. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 130-131, 1 fig. Report of Am. Ry. Assn. committee giving instructions on installation, maintenance and operation of storage batteries of both lead and nickel alkaline types, and care and installation of insulated wire.

Telegraph and Telephone Practice. Telegraph and Telephone Practice, Chas. S. Rhoads. Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 173-175, 12 figs. West. Elec. Co. development of selectors, group type, intercalling and time sending.

Track Circuiting. Maintenance of D. C. Track Circuits, R. J. Cox. Ry. Signaling, vol. 17, no. 5, May 1924, pp. 205-206. Track-circuit troubles and their causes; bonding and track connection as cause of trouble.

Train Control. See RAILWAY OPERATION, Train Control.

Voltmeters in Signal Maintenance. See VOLTMETERS, Uses in Signal Maintenance.

RAILWAY STATIONS

Berlin. Reconstruction of the Railway Station at Friedrichstrasse in Berlin (Umbau des Bahnhofs Friedrichstrasse in Berlin), M. Brodführer. Bautechnik, vol. 2, no. 26, June 17, 1924, pp. 259-267, 22 figs. Details of new design of tracks, signal arrangements, administration buildings, etc., to provide for large increase in traffic.

Champaign, Ill. Station Designed for Occasional Crowds at Champaign. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 294-295, 3 figs. Illinois Central R. R. improves facilities at university city of Champaign, Ill., by elevation of its tracks and construction of new passenger station with unusual feature of having station tracks at two levels; high-level tracks with island platform between passenger tracks for regular and through service and ground-level tracks and platforms for use at times when great crowds assemble at university.

Stuttgart, Germany. Track Galleries of the New Main Railway Station at Stuttgart (Die Gleishallen des neuen Hauptbahnhofs zu Stuttgart), M. Schaechterle. Deutsche Bauzeitung, vol. 58, nos. 66 and 70, Aug. 16 and 30, 1924, pp. 129-132 and 142-143, 13 figs. Details of design and construction of track galleries of wood on iron frames in place of expensive arched halls; experience shows them to be satisfactory.

RAILWAY SWITCHES

Automatic Block. The Switches of Automatic Section-Block Installations (Die Schaltungen der selbsttätigen Streckenblockanlagen), Arndt. Siemens-Zeit., vol. 4, nos. 3 and 4-5, Mar. and Apr-May, 1924, pp. 89-93 and 108-112, 14 figs. Describes Siemens & Halske system.

Electric, Drives for. Drives for Electric Switches and Signals, Siemens & Halske Types (Antriebe für elektrische Weichen- und Signalstellung, Bauart Siemens u. Halske), K. Becker. Bautechnik, vol. 2, no. 49, Nov. 14, 1924, pp. 552-557, 11 figs. Discusses principles on which state regulations and designs are based, and gives diagrams of the various positions during operation.

Operation from Gate Tower. Canadian National Low-Voltage Plant, C. H. Tillet. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 463-465, 7 figs. Operating crossover and junction switches from gate tower, at Brantford, Ont., expedites traffic and effects economies.

Recommended Plans for. Detail Plans of Switches and Frogs, Crossings and Double Slip Switches. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 263, Jan. 1924, pp. 451-452. Contains 14 plans, on supp. plates, recommended by Track Sub-Committee for adoption as recommended practice.

Spring. Spring Switches Reduce Delays on Santa Fe, D. K. Crawford. Ry. Age, vol. 76, no. 26, May 31, 1924, pp. 1313-1314, 3 figs. See also Ry. Eng. & Maintenance, vol. 20, no. 6, June 1924, pp. 222-223, 3 figs.; and Ry. Signaling, vol. 17, no. 6, June 1924, pp. 244-245, 5 figs. Installations at ends of passing tracks and yard outlets under signal protection prevent train stops.

RAILWAY TIES

Concrete. A New Design of Concrete Tie. Elec. Traction, vol. 20, no. 8, Aug. 1924, p. 369, 2 figs. Division engineer on British Ry. in India invents concrete tie of interesting type; consisting of two concrete blocks joined together by steel bar of small cross-section.

Concrete Ties for Light-Traffic Track in France, Adam. Eng. News-Rev., vol. 92, no. 18, May 1, 1924, p. 761, 1 fig. Reduction of maintenance forces and cost follows replacement of wood ties by concrete ties and pairs of blocks.

Railway Sleepers of Reinforced Concrete, W. Bockli. Commonwealth Engr., vol. 11, no. 7, Feb. 1, 1924, pp. 257-262, 4 figs. Particulars regarding Asbeston railway tie of Int. Siegwart Beam Co. of Lucerne, Switzerland.

The Utilization of Reinforced-Concrete Ties (Utilisation de traverses en béton de ciment armé), M. Adam. Revue Générale des Chemins de Fer, vol. 43, no. 2, Feb. 1924, pp. 105-113, 9 figs. Discusses their employment for reducing maintenance expenses of secondary lines; experiences of the Orléans Co. with concrete ties on 21-km. line section between Hautefort and Terrasson.

Forecasting Requirements for. How a Road Can Forecast Its Tie Requirements, E. Stimson. Ry. Age, vol. 76, no. 20, Apr. 19, 1924, pp. 993-994. See also Wood Preserving News, vol. 2, no. 7, July 1924, pp. 109-112. Average life for untreated ties is 9 1/3 yr. and 16 yr. for treated ties. Tables estimating cross-tie requirements of B. & O. for 1922 and 1923 and cross-tie renewal experience and projection for B. & O.

Preservative Treatment. Comparative Tests with Wooden Railway Ties Impregnated with Tar Oil or Basilite (Vergleichsversuche an Holzschwellen, die mit Teeröl oder Basilit getränkt sind), H. P. Maas-Geesteranus. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 4, Apr. 15, 1924, pp. 74-78. Results of tests with tar-oil ties and basilite ties after 10 years' service show basilite to be more economical as impregnating material. It consists of 89 sodium fluorite and 11 parts dinotrophenol-analine.

Improving Method of Treating Ties with Zinc Chloride, J. D. MacLean. Ry. Eng. & Maintenance, vol. 20, no. 4, Apr. 1924, pp. 160-162, 4 figs., 3 tables. Experiments show way to improve treatment, reduce fuel consumption and increase plant output.

New Tie-Treating Plant on the Oregon-Washington R. R. Eng. News-Rec., vol. 92, no. 21, May 22, 1924, pp. 894-896, 6 figs. Four retorts for zinc-chloride process; long narrow tie storage yard served by hammer-head gantry crane; methods of treatment.

Report of Committee on Wood Preservation, A.R.E.A. Ry. Rev., vol. 74, no. 11, Mar. 15,

1924, pp. 566-567. Because of difficulty in securing a creosote which will meet standard specifications of Am. Ry. Eng. Assn., there has been strong pressure brought to bear to have A.R.E.A. revise its specifications to extent which will allow creosotes of lower specific gravity than are permitted by present standard. (Abstract.)

Superiority of Treated Ties Proved by a Nine Years' Test on Chicago & North Western Railway. Wood Preserving News, vol. 2, no. 5, May 1924, pp. 72-73. Seven varieties of timber, untreated and treated by three standard processes, installed on eight divisions show great economy of tie preservation.

The Dhilwan Creosoting Plant, H. L. Woodhouse. Roy. Engrs. Jl., vol. 38, no. 2, June 1924, pp. 205-210. Discusses creosoting and creosoting plant of Northwestern Ry. of India, methods, costs, fire protection, etc.

Wood Preservers Show Economy of Treatment. Ry. Age, vol. 76, no. 3, Jan. 19, 1924, pp. 233-235, 1 fig. Results of tests and service records on use of creosote-petroleum oil mixture for treating ties; increases tie life; promises to cut cost. Abstract of Am. Wood-Preservers' Assn. report.

Size and Spacing. Preferences as to Tie Size and Spacing. Eng. & Contracting (Railways), vol. 61, no. 6, June 18, 1924, pp. 1351-1357. Reports of 92 roads aggregating 144,000 miles of track summarized in Appendix B of report of Committee on Ties, Am. Ry. Eng. Assn., submitted at annual convention of the association, Mar. 11-13, 1924.

Steel, Corrosion of. The Causes of Premature Failure of Ribbed Ties (Ueber die Ursachen der vorzeitigen Zerstörung von Rippenschwellen), R. Kühnel and G. Marzahn. Stahl u. Eisen, vol. 44, no. 7, Feb. 14, 1924, pp. 175-178, 4 figs. Describes nature of damages occurring in railway ties; chemical investigation; investigation of mechanical properties and of structure; main cause of corrosion is attributed to poor design; protection of ties against corrosion.

Tie Plates. Report of Committee on Track, A.R.E.A. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 523-524. Report on effect of brine drippings on tie plates, precurving rail, and resawing and reconditioning of rails (Abstract.)

Treating Plant. See MATERIALS HANDLING, Tie-Treating Plant.

Types, Comparison of. Railway Sleepers, F. H. Clark. Assn. Chinese & Am. Engrs.—Jl., vol. 4, no. 9, Nov. 1923, pp. 6-13. Present conditions in China; efforts made in other countries to secure better or less expensive supply of ties; how experience and research of other countries can be advantageously applied to conditions in China.

RAILWAY TRACK

Air Compressors and Track Work. See AIR COMPRESSORS, Development for Track Work.

Concrete Roadbed. Trials of Concrete Roadbed on Northern Pacific Ry. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, p. 858. Three types of concrete slab base indicate higher maintenance cost than that for ordinary ballasted track construction.

Construction. Track Construction Differs from Practice Here. Elec. Ry. Jl., vol. 64, no. 12, Sept. 20, 1924, pp. 437-440, 7 figs. Particular features are absence of cross ties in concreted track, method of sealing rail against moisture and pressure system of thermit welding joints.

Crossing Dimensions. A Proposal as to Standard Formulae for Calculating Points and Crossing Dimensions, W. Hepworth. Ry. Engr., vol. 45, no. 529, Feb. 1924, pp. 54-56, 5 figs. Importance of establishment of a series of standard mathematical formulas, and a series of practical working rules deduced therefrom, applying at least to simple turnout.

Standard Formulae for Calculating Point and Crossing Dimensions, R. D. Walker. Ry. Engr., vol. 45, no. 537, Oct. 1924, pp. 339-340, 4 figs. Problems illustrating use of standard formulas as given for four methods, and more difficult problems.

Culverts. See CULVERTS.

Curves. Continuous Transition Curves and Their Diverse Applications (Les raccordements à courbure continue dans leurs diverses applications), P. de Bruyne. Assn. des Ingenieurs sortis des Ecoles spéciales de Gand—Annales, vol. 13, no. 4, 1923, pp. 351-437, 1 fig. Comparison of different curves which can be employed and their application in each particular case. Bibliography.

The Cubic Transition Railway Spiral, M. K. Rice-Oxley. Instn. Civ. Engrs.—Sessional Notices, no. 3, Feb. 1924, pp. 73-74. Author derives suitable curve and endeavors to show how it may be set out by rectangular offsets or by theodolite without use of tables or complicated formulas. (Abstract.)

Track Curves (Gleiskurven), E. Rauer. Bautechnik, vol. 2, no. 49, Nov. 14, 1924, pp. 557-559, 3 figs. Discusses problems of unequal movement of wheels on curves, and grinding of wheel flanges; and curves in which outer wheel flanges run on rails, for factory use, to dispense with a turntable.

Curves, Guard Rails for. Guard Rails on Sharp Curves, J. J. Burns. Ry. Rev., vol. 75, no. 9, Aug. 30, 1924, pp. 327-329, 5 figs. Louisville & Nashville Ry. uses new type of guard rail fastening on lines of sharp curvature and heavy traffic.

Depression and Elevation Combination. C. & N. W. Ry. Depresses Busy Main Line at Milwaukee. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 570-574, 8 figs. Grade-crossing elimination improves operating conditions; new four track line; one running track maintained during work; three types of monolithic and precast concrete walls.

Electric Railways. See ELECTRIC RAILWAYS, Track.

Elevation of. Important Track Elevation Work Completed at Elyria, Ohio. Ry. Rev., vol. 75, no. 9, Aug. 30, 1924, pp. 312-315, 8 figs. Completion of work gives New York Central four tracks through Elyria, eliminating seven crossings in heart or city.

Rogers Park Track Elevation, C. M. & St. P. Ry., T. H. Strate. Ry. Rev., vol. 74, no. 3, Jan. 19, 1924, pp. 140-145, 13 figs. Describes work of elevating Chicago & Evanston division between Irving Park boulevard and Howard street in Chicago, Ill., operated by Northwestern Elevated R. R. Co., eliminating grade crossing.

Track Elevation at Minneapolis, N. P. Ry. Ry. Rev., vol. 74, no. 18, May 3, 1924, pp. 801-802, 5 figs. Track-elevation program in Minneapolis, Minn., which covers period of 5 years and eliminates 17 crossings.

Four-Tracking and Grade Separation. Pennsylvania Completes New Four-Track Work. Ry. Age, vol. 77, no. 1, July 5, 1924, pp. 7-11, 9 figs. Project of four tracking and grade separation, known as Pittsburgh Northside improvements, recently carried forward by Pennsylvania railway in order to provide two tracks for operation as a through line for east and westbound traffic around Pittsburgh. Notes on how work was carried out.

Frogs. See RAILS, Frogs.

Gages. Railway Gauges, L. Wiener. Int. Ry. Congress Assn.—Bul., vol. 6, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 35-70, 87-120, and 163-206, 21 figs. Discusses main-line and secondary-line gages, and employment of different gages for railways in same country; comparison of gages; influence of gage on construction and operation of railways; trans-shipment; break of gage; conversion and standardization.

Grade Crossings. Can the Grade Crossing Be Made Less Dangerous. Ry. Age, vol. 76, no. 23, May 10, 1924, pp. 1137-1140. Railway and public authorities consider ways of reducing loss of life at crossings. Report of conference to discuss-grade crossing accident problem called at instance of Nat. Assn. Railroad & Utilities Commissioners.

Electrically Operated Gates at Mount Pleasant Crossing, Southampton, Southern Railway, W. J. Thorrowgood. Ry. Gaz., vol. 40, no. 25, June 20, 1924, pp. 879-882, 4 figs. Results of power tests of gates; describes operating mechanism; emergency arrangements.

Eliminating Grade Crossings by Highway Relocation, M. W. Torkelson. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, pp. 403-405, 1 fig. Wisconsin work in grade-crossing improvement; opposition of railroads; principles of cost apportionment should be established.

Kensington-Delavan Grade Crossing Elimination. Ry. Rev., vol. 75, no. 11, Sept. 13, 1924, pp. 383-389, 10 figs. Erie and Lackawanna Rys. jointly eliminate two important street crossings at grade at Buffalo, N. Y.

Report on Highway Crossing Protection. Ry. Signaling, vol. 17, no. 3, Mar. 1924, pp. 123 125, 2 figs. Report of Am. Ry. Assn. committee on requisites for automatic signals used for highway crossing protection, transmission values, reflectors, circuits, code on colors for traffic signals.

Grade Reduction vs. Heavier Power. Grade Reduction or Heavier Power. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 509-510. Appendix A, preliminary report of Committee on Economics of Railway Location, Am. Ry. Eng. Assn.

Grade Separation, Detroit. Grade Separation at Detroit, Grand Trunk Railway. Eng. News-Rec., vol. 93, no. 2, July 10, 1924, pp. 60-62, 4 figs. City to share expense of track depression with railroad. Four-track cut in right-of-way on public street requiring 22 bridges at consecutive streets.

Improvements, Pennsylvania Ry. Improving Cleveland-Pittsburgh Line—Pennsylvania R. R. Eng. News-Rec., vol. 92, no. 3, July 17, 1924, pp. 88-92, 6 figs. Grade reduction and line revision on heavy-traffic division increases train loads by 800 tons, reduces pusher engine mileage, and relieves congestion on adjacent division. Details of construction work and operating conditions, and economics of grade reduction.

Inspection Car. Track Inspection on the Erie R R. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 503-508, 11 figs. Describes special car designed and built for better track inspection, by reconstructing a passenger car, and fitted with instruments which record all low joints, line and surface, gage and lurches; charts made by car are blueprinted and copies of their respective sections sent to track foremen to locate and correct defects recorded.

Junctions with Curved Main Lines. Junctions with Curved Main Lines. Ry. Engr., vol. 45, no. 553, June 1924, pp. 218-219, 5 figs. Outline of method for calculating and setting up double line junctions with curved main lines.

Laying. Laying Railway Tracks in City Streets. Ry. Eng. & Maintenance, vol. 20, no. 5, May 1924, pp. 1924, pp. 188-191, 7 figs. Modern practice utilizes heavy girder rails and concrete-base construction for best results; Method employed on Delaware Ave., on Philadelphia waterfront.

Platelaying With the Anderson Rail Conveyor. Ry. Engr., vol. 45, no. 529, Feb. 1924, pp. 58-60, 5 figs. Account of track-laying work carried out on Bengal-Nagpur Ru. in India with aid of a simple machine invented by A. T. D. Anderson; description of machine.

Maintenance. Maintenance Methods on the Lehigh Valley R. R., G. L. Moore. Ry. Rev., vol. 74, no. 2, Jan. 12, 1924, pp. 101-103, 5 figs. Summary of results obtained by use of heavy rail and economy in labor.

Preservative Treatment. New Treating Plant Employs Modern Methods. Ry. Age, vol. 77, no. 9, Aug. 30, 1924, pp. 359-361, 6 figs. Describes tie and timber treating plant which Atchison, Topeka & Santa Fe is now completing at National City, Cal., for treatment of Douglas fir ties and timbers to be used on Santa Fe coast lines. Represents striking example of present-day tendencies in operating arrangements of such facilities.

Rail Canting. Canting of Rails Now Favored by Many Roads. Ry. Age, vol. 77, no. 10, Sept. 6, 1924, pp. 404-406, 1 fig. Developments which have taken place on 36 representative roads in United States and Canada on question of canting rail inward in order to provide a bearing surface more nearly coinciding with contour of car and locomotive wheels.

Rail Joints. See RAILS, Joints.

Rails. See RAILS.

Rails, Precurving. See RAILWAY TIES, Tie Plates.

Reconstruction. Rebuilding 178 Miles of Line in Four Months, W. S. Wollner. Ry. Age, vol. 77, no. 8, Aug. 23, 1924, pp. 319-322, 4 figs. Methods used by Western Pacific in overhauling its property in Nevada, in connection with agreement with Southern Pacific to operate their single track lines between Alazon and Weso, Nev., as a double track line.

See also VIADUCTS, Concrete-Arch.

Snow-Protecting Structures. Snow-Protecting Structures for High Altitude Railways (Sneforbygninger paa höifjeldsbaner), G. R. Lorange. Teknisk Ukeblad, vol. 71, nos. 5 and 6, Feb. 1 and 8, 1924, pp. 45-47 and 56-59, 17 figs. Describes a number of wooden structures designed to keep snow off railway tracks in very effective ways.

Street Railways. See STREET RAILWAYS, Track.

Stresses in. Relation of Track Stress to Locomotive Design, C. T. Ripley. Ry. Age (Daily Edition), vol. 76, no. 32, June 14, 1924, pp. 1457-1553 and (discussion) 1553-1558, 10 figs. History of study of track stresses; describes stremmatograph and its use in measuring rail stresses and gives results of number of tests run on A. T. & S. F.

Track Stresses, C. T. Ripley. Ry. & Locomotive Eng., vol. 37, no. 7, July 1924, pp. 208-210, 2 figs. Series of stremmatograph tests made on large electric locomotives. First series of tests made on and near horseshoe curve in New Mexico on tangent track and 6-deg. and 10-deg. curves, showed that some high stresses were obtained under these locomotives, especially on 10-deg. curves.

Switches. See RAILWAY SWITCHES.

Ties. See RAILWAY TIES.

Track-Bolt Specifications. Specifications for Quenched Carbon Steel and Alloy Steel Track

Bolts. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 263, Jan. 1924, pp. 403-405. Specification covering materials, chemical and physical requirements, design and tolerance, manufacture, inspection, and marking.

Traversers. 35-Ton Electric "Surface" Traverser. Engineer, vol. 138, no. 3577, July 18, 1924, pp. 84-85, 2 figs. Describes traverser constructed by S. H. Heywood & Co., Ltd., Reddish, Eng., for Bengal-Nagpur Ry. Co.'s workshops at Khargpur, for transferring rolling stock on parallel tracks.

Turntables. New 85-Ft. Diameter Locomotive Turntables for the Bombay Baroda & Central India Railway Company. Ry. Gaz., vol. 41, no. 10, Sept. 5, 1924, pp. 310-311, 4 figs. Turntable has diameter of 85 ft. and is designed for 5 ft. 6 in.-gage locomotives weighing up to 200 tons; deck type with central balance.

Southern Pacific Renews Turntable in Record Time. Ry. Eng. & Maintenance, vol. 20, no. 9, Sept. 1924, pp. 356-358, 5 figs. Southern Pacific Ry. replaces old 35-ton, 70-ft. deck girder turntable with new 90-ton, 100-ft. half-through truss table in 1 hr. and 46 min.

Turntable Renewal is Accomplished Under Difficulty, R. C. Henderson. Ry. Eng. & Maintenance, vol. 20, no. 8, Aug. 1924, pp. 300-302, 7 figs. Baltimore & Ohio Ry., Lima, Ohio, replaced 90-ft. turntable by one having length of 100 ft.

Water Pick-Up Systems. Water Troughs on the Great Western Railway. Ry. Gaz., vol. 40, no. 6, Feb. 8, 1924, pp. 168-172, 6 figs. Standard permanent way with cross-ties used; troughs shaped with inturned edges at top to reduce splashing when water is being taken up by locomotive.

Weed Burners. Illinois Central Improves Equipment for Burning Weeds with Oil, C. R. Knowles. Ry. Eng. & Maintenance, vol. 20, no. 11, Nov. 1924, pp. 433-435, 5 figs. Economy and effectiveness of process augmented by atomizing oil with steam.

Welding. Manganese Special Work Welding, E. J. Shuler. Elec. Traction, vol. 20, no. 1, Jan. 1924, pp. 32-33, 4 figs. Progress in welding of manganese special work, such as solid manganese crossings, frogs and switch tongues, and manganese insert work, on lines of New Orleans Public Service Co.; shows many economies.

RAILWAY YARDS

Classification. Shunting, Marshalling and Sorting Yards, R. H. Nicholls. Ry. Gaz., vol. 41, nos. 24, 25, and 26, Dec. 12, 19, and 26, 1924, pp. 761-764, 791-794, and 818-821, 15 figs. Principles of location and design; yard site in relation to yard working; ideal layout; British and Dominion practice compared; gravitation shunting methods; layout of points and switches. (Abstract.) Report covering Great Britain, Northern Ireland, India, and British Dominions, Protectorates and Colonies, submitted to Int. Ry. Congress Assn.

Electric Switch Lighting. Electric Switch Lighting in Yards with Signals, Geo. S. Pflasterer. Ry. Signaling, vol. 17, no. 4, Apr. 1924, pp. 161-162, 3 figs. Use of commercial current in connection with signal feed line reduces cost one-half as compared with oil.

Flood Lighting. Floodlighting Railroad Yards, E. G. McAllister. Elec. World, vol. 83, no. 26, June 28, 1924, pp. 1329-1332, 6 figs. Adoption of this practice has materially increased operating efficiency and safety on Norfolk & West. R. R.; details of installation; costs and operating results.

Railroad Yard Lighting, W. C. Gilman. Ry. Elec. Engr., vol. 15, no. 6, June 1924, pp. 185-189, 6 figs. Discusses various methods of using floodlighting projectors, with advantages of each.

Freight. Markham Yard, W. P. Cronican. West. Soc. Engrs.—Jl., vol. 29, no. 6, June 1924, pp. 257-262. Principal features of design of new classification yard of Ill. Central R. R. Co. Will handle practically all freight entering or leaving Chicago district. See also paper by A. Bernard giving operating features, pp. 263-264.

Grade-Adjusting Device. Mechanical Adjustment of Grade for Gravity Switching. Eng. News-Rec., vol. 93, no. 7, Aug. 14, 1924, pp. 260-262, 4 figs. Describes "mechanical hump" for varying grade at summit of incline for gravity switching at Ecorse freight yard at new Detroit terminals of Pennsylvania-Detroit R. R.; table which forms summit of hump raised and lowered by jacks; starting grade varied from 1 to 3 per cent.

Gravity Tracks. Gravity Tracks of Switching Stations (Zur Gestaltung der Ablaufanlagen auf Verschiebebahnhöfen), A. Baumann. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 14, Oct. 30, 1924, pp. 316-325, 12 figs. Layout of yards and lines; location of hills; etc.

Lighting. See Flood Lighting; LIGHTING, Railway Yards.

Switching. A Proposed Catapult Switching Yard, F. W. Eagelston. Eng. & Contracting (Railways), vol. 61, no. 2, Feb. 20, 1924, pp. 409-414, 4 figs. Economic necessity of some radical improvement in present methods of switching freight cars. Description of novel process and means devised by author.

Shunting Yards, R. H. Nicholls. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 877-906, 15 figs. General principles of layout; details of layout and yard operations; yard and staff organization.

Shunting Yards, S. T. Wagner. Int. Ry. Congress Assn.—Bul., vol. 6, no. 10, Oct. 1924, pp. 793-846, 10 figs. Report illustrating practice on a number of leading railways in United States and Canada, information for which was obtained in response to a questionnaire intended to allow each railway to submit a type of yard which they considered representative and give data as to layout and organization.

RAILWAYS

American, Organization of. Present Day Organisation of American Railways, F. H. Budden. Inst. Transport—Jl., vol. 5, no. 6, Apr. 1924, pp. 279-289. Particulars regarding line and staff organization, departmental system, duties of officers on a division, Pennsylvania system, organization on N. Y. Central lines, etc.

Automobile Service. Automobile Traction for Railway Services (Utilisation de la traction automobile dans les services annexes des chemins de fer), M. De Lalande. Revue Générale des Chemins de Fer, vol. 43, no. 6, Dec. 1924, pp. 417-425, 7 figs. Discusses use of automobiles by railways in Paris and the provinces, including the various types employed, both for passenger and goods transportation.

Buildings. Specifications for Railway Buildings. Am. Ry. Eng. Assn.—Bul., vol. 26, no. 268, Aug. 1924, 122 pp., 20 figs. Specifications covering excavation, filling and backfilling; sewers and drainage; brickwork; carpentry and millwork; lathing and plastering; hardware; painting and glazing; plumbing; heating; stone masonry and cut stone work; clay hollow tile; marble and tile work; concrete roofing tile; clay tile roofing; electric light wiring; architectural terra cotta; concrete architectural stone; and floors.

Buildings, Floors for. Floors for Railway Buildings. Ry. Rev., vol. 74, no. 11, Mar. 15,

1924, pp. 498-499. See also Eng. & Contracting (Railways), vol. 61, no. 5, May 21, 1924, pp. 1120-1122. Report of Buildings Committee, Am. Ry. Eng. Assn., after investigation of 37 representative railways to determine type of floor most commonly used in the various kinds of buildings.

Buildings, Paints for. See PAINTS, Railway Buildings.

Central America. Central America's Largest Road American-Owned, F. J. Lisman. Ry. Age, vol. 77, nos. 9 and 10, Aug. 30 and Sept. 6, 1924, pp. 377-380 and 417-420, 12 figs. International Railways of Central America, with 600 miles of line, largest American-owned railroad enterprise outside of United States. General features, character of traffic, difficulties of construction, operating practices, etc.

China. The Peking-Mukden Railway, D. P. Ricketts. Ry. Gaz., vol. 40, no. 8, Feb. 22, 1924, pp. 234-236, 14 figs., partly on pp. 237-240. Discusses development and gives operating data.

Construction. See RAILWAY CONSTRUCTION.

Developments, 1923. Foreign Railway Developments in 1923. Ry. Age, vol. 76, no. 1, Jan. 5, 1924. Contains following articles: Great Britain, W. H. Fraser, pp. 99-102, 5 figs.; France, M. Peschaud, pp. 103-105, 2 figs.; Italy, A. Giordano, pp. 106-108, 5 figs.; Belgium, R. H. Sheffield, pp. 109-112, 3 figs.; The Netherlands, C. Schotel, pp. 113-114, 3 figs.; Danish Railways, A. Blichfeldt, pp. 115-116, 4 figs.; Polish Railways, G. M. Oehm, pp. 117-118, 1 fig.; Czechoslovak Railways, V. Partl, pp. 119-122, 7 figs.; Balkan Railways, Lazarovich-Hrebelianovich, pp. 122-128, 8 figs.; Austria, A. Niklitchek, pp. 134-136, 6 figs.; Germany and Some Other European Countries, pp. 137-138, 4 figs.; Egypt, pp. 139-142, 7 figs.; South African Railways, G. E. Chittenden, pp. 143-145, 8 figs.; Future of Railways in Turkey, A. Vahid Bey, pp. 146-150, 7 figs.; China, pp. 151-154, 7 figs.; Railways of Japan and South Manchuris, E. A. Simmons, pp. 155-158, 5 figs.; Australia, W. H. Newman, pp. 159-162, 6 figs.; India's Railways, pp. 163-165, 5 figs.; Railways of Argentina, M. T. Meadows, pp. 166-167, 1 fig.

Electric. See ELECTRIC RAILWAYS.

Electrification. See RAILWAY ELECTRIFICATION.

Elevated. See ELEVATED RAILWAYS.

Employee Ownership and Control. Railroad Ownership and Control by Employees, J. P. Muller. Ry. Age, vol. 77, no. 16, Oct. 18, 1924, pp. 681-682. Plan for achieving efficiency and "industrial democracy" under private ownership.

Equipment. See RAILWAY EQUIPMENT.

Funicular, Penang Island. The Penang Hills Railway. Engineering, vol. 118, nos. 3072, 3074, 3076, and 3078, Nov. 14, 28, Dec. 12 and 26, 1924, pp. 664-668 and 678, 726-730 and 740; 789-792 and 804, and 852-853, 81 figs. Funicular railway has total length of 1 mi. 435 yd., and upper station is situated 2381 ft. above sea level; construction consists of viaducts alternating with cuttings, and there is tunnel 258 ft. long which is one of steepest in world. Details of passenger cars. Describes winding engines or hoists. Electrical arrangements installed in connection with haulage-engine operation.

Germany. Technical Railway Session in Berlin (Die Eisenbahntechnische Tagung in Berlin), Baumann. Archiv für Eisenbahnwesen, no. 6, Nov.-Dec. 1924, pp. 915-937. See also Organ für Fortschritte des Eisenbahnwesens, vol. 79, no. 14, Oct. 30, 1924, pp. 307-315. Details of session and exposition at Seddin under auspices of State Ry. Administration and V. D. I., including railway cars and brakes, locomotives (except electric), electricity in railway operation, safety and signaling, permanent way and bridges, railway stations, workshops, etc.

The Berlin Congress and Exhibition for Railway Engineering. Eng. Progress, vol. 5, no. 12, Dec. 1924, pp. 261-264, 3 figs. Special events of congress, including brake-test trip, and practical demonstration of radiotelephony on Berlin-Wittenberge line; outstanding exhibits at Seddin.

Government Regulation. The Development of Railroad Regulation, F. McManamy. Ry. Age (Daily Edition), vol. 76, no. 34, June 17, 1924, pp. 1623-1627. See also Ry. & Locomotive Eng., vol. 37, no. 7, July 1924, pp. 215-219. Review of scope and effect of what U. S. Government has done in way of legislation affecting railroads; unification; provisions to stabilize credit.

Ice Houses and Icing Stations. Ice Houses and Icing Stations. Ry. Rev., vol. 74, no. 11, Mar. 15, 1924, pp. 556-557. Appendix A, report of Buildings Committee of Am. Ry. Eng. Assn. Presented for approval for publication in manual.

India. The East Indian Railway: Its Construction and Development. R. Highet. Ry. Gaz., vol. 40, no. 9, Feb. 29, 1924, pp. 266-276 and 280, 15 figs. Review of growth of this system and analysis of freight and passenger traffic; nearly 2500 miles in length.

The Khyber Railway. Ry. Gaz., vol. 40, no. 19, May 9, 1924, pp. 664-669, 17 figs. Notes regarding railway under construction which will connect India and Afghanistan, including data on construction.

Industrial. See INDUSTRIAL PLANTS, Railway Switching Equipment; Railways.

Interstate Commerce Commission Report. I. C. C. Annual Report to Congress. Ry. Age, vol. 77, no. 23, Dec. 6, 1924, pp. 1029-1034. See also Ry. Rev., vol. 75, no. 23, Dec. 6, 1924, pp. 908-911. Abstract of report of Interstate Commerce Commission making new recommendations for legislation; review of year's activities.

Italy. Progress in the Construction of the Direct Bologna-Florence Line (L'avanzamento della direttissima Bologna-Firenze). Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 6, June 15, 1924, pp. 190-200, 5 figs. Discusses resumption of construction interrupted by war, tunneling work, bridge construction, etc.

Japan. Railways in the Japanese Empire, S. T. Dodd. Gen. Elec. Rev., vol. 27, no. 4, Apr. 1924, pp. 227-237, 15 figs. Observations made during a years' study of Japanese railway system, before disastrous earthquake of Sept. 1, 1923. Historical notes; physical characteristics of Imperial Japanese Railways; difficulties encountered in building railways in Islands of Japan, and description of type of road bed, bridges, etc., comparison between Japanese and American rolling-stock practice and railway traffic density. A comprehensive scheme of electrification has been decided on with 1500 volts d.c. as standard, calling for total of 336 electric locomotives by the year 1928.

Railways of Japan (Die Eisenbahnen des japanischen Inselreichs), Baltzer. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 13, Oct. 15, 1924, pp. 287-292. Details of developments covering Tokaido, Shin-Etsu and Usui pass, Chuo or Nakasendo, Fukushima, Nippon, Sanyo and Kinshiu lines.

Location. Railway Location, C. S. Czowski. Can. Ry. Club—Proc., vol. 23, no. 9, Dec. 1924, pp. 20-42 and (discussion) 42-44, 4 figs. Points out that surveys can determine with reasonable accuracy how much line will cost built to certain standards; standards for construction may be grouped under four main headings: gradients to be employed, curvature, strength of track structure and bridges; permanence of materials used; factors which affect operating cost, and conse-

quently become factors in location of line are; gradients, rise and fall, curvature and distance.

Maintenance. See RAILWAY MAINTENANCE.

Management. See RAILWAY MANAGEMENT.

Motor Cars for. See RAILWAY MOTOR CARS.

Oil Houses. Model Oil House of Reinforced Concrete, P. & R. Ry., R. J. Stackhouse. Ry. Rev., vol. 74, no. 7, Feb. 16, 1924, pp. 288-290, 7 figs. See also Ry. Mech. Engr., vol. 98, no. 3, Mar. 1924, pp. 147-149, 6 figs. Description of house for oil storage, at Reading, Pa., designed to eliminate leakage and tank waste and insure good clean oil with maximum service at minimum cost.

Operation. See RAILWAY OPERATION.

Problems. The Ultimate Question About the Railroads, V. Jordan. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 283-286. Extracts from discussion on railway performance at Nat. Indus. Conference Board; discusses problems of plant and equipment; reasons for increased performance; railway labor; coöperation of public.

Rack. Thirty Years of Barmen Mountain Railway (30 Jahre Barmer Bergbahn), E. Körne. Elektrotechnische Zeit., vol. 45, no. 36, Sept. 4, 1924, pp. 949-951, 4 figs. Describes rack railway from Barmen to Toelle tower, electric equipment, etc., using cars of capacity of 24 to 36 persons.

Repair Shops. See RAILWAY REPAIR SHOPS.

Scrap Utilization. Utilization of Discarded Railway Material (Die Altstoffwirtschaft in den Eisenbahnwerken), Haas. Glasers Annalen, vol. 95, nos. 10 and 11, Nov. 15 and Dec. 1, 1924, pp. 240-246 and 259-267, 30 figs. Economic losses in World War have led to a systematic utilization of discarded railway material for reasons of economy; methods and plants for such utilization; sorting and storing of scrap, wrecking locomotive boilers, etc.

Shops. See RAILWAY SHOPS.

Signaling. See RAILWAY SIGNALING.

Statistics, Development of. Development of Railway Statistics, A. E. Kirkus. Int. Ry. Congress Assn.—Bul., vol. 6, no. 11, Nov. 1924, pp. 947-1005. Deals with those statistics which are used for purpose of watching operating results, and makes brief reference to compilation of particulars which are not primarily operating statistics. Particulars of statistics compiled and changes made in individual countries.

Street. See STREET RAILWAYS.

Track. See RAILWAY TRACK.

Train Resistance to Motion. The Resistance of Express Trains, C. F. D. Marshall. Serial article in Ry. Engr., vol. 45, beginning Jan. and ending Nov. 1924, 44 figs., partly on supp. plate. Jan.: Critical discussion of present state of theory and practice of subject, and suggestions for development of former and improvement of latter. Feb.: Atmospheric resistance in a calm; resistance constants for carriages; effect of acceleration. Mar.: Effect of gradients; speeds on gradients; effect of curves. Apr.: Natural wind; effect of direct wind; effect of wind gusts on frontal pressures; limiting speeds. May: Resultant wind; angle of resultant for various wind angles; effect of speed on resultant wind; ratios of speed of resultant to that of travel. June: Effect of oblique winds; consideration of flange friction; lines of flow round train. July: Oblique winds and air resistance; effect for different kinds of train; effect of gusts on resultant wind; resistance of engines. Aug.: Consideration of tests conducted on Great Western and Lond. & North Western Rys.; use of speedometers and engine indicators. Sept.: Resistance of electric cars; results of tests on Berlin-Zossen line. Oct.: Question of shape; improvements to shape of smokebox and chimney; importance of reducing air reistance of outside details. Nov.: Extreme speeds; French treatise; summary of principal formulas.

Transportation. See TRANSPORTATION, Railway.

Valuation. Railroad Valuation, A Brief Survey, Wm. D. Pence. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, pp. 406-408. Outline sketch of origin and growth of valuation movement leading up to Federal Act; what has been achieved to date, and present-day prospects for useful outcome.

Yards. See RAILWAY YARDS.

RAINFALL

Data on. See DRAINAGE, Storm-Water Drains.

Determination. Determining the Mean Precipitation on a Drainage Basin, R. E. Horton. New England Water Wks. Assn.—Jl., vol. 38, no. 1, Mar. 1924, pp. 1-43 and (discussion) 44-47, 15 figs. partly on supp. plate. Supplementary data on methods of measurement of rainfall and snow, including application of rainfall data to determination of mean precipitation on a drainage basin. Means of making best possible or most probable determination of monthly, seasonal, annual, or mean precipitation over a drainage basin, with a minimum of labor.

Drainage and. See DRAINAGE, Rainfall and.

Intensity vs. Duration. Investigation of the Connection Between the Intensity and the Duration of Rain (Ett säreget bromontage), K. Kinch. Teknisk Tidskrift, vol. 54, no. 30, July 26, 1924, pp. 81-82 (väg- och vattenbyggnadskonst), 3 figs. Statistics show that longer duration of uninterrupted rain is less in its intensity.

Run-off. Precipitation and Runoff Near the Continental Divide, Rob. E. Horton. Eng. News-Rec., vol. 92, no. 9, Feb. 28, 1924, pp. 355-358, 4 figs. Study of records for basins mostly at elevation 9000 ft. on both slopes of Colorado Rockies indicate that orientation and snowfall largely account for greatest run-off.

Surface Yield from a Hydrographical Basin. Engineering, vol. 97, no. 3033, Feb. 15, 1924, pp. 193-195, 3 figs. Conditions which influence yield from basin; how rain falling on basin is disposed of; table giving approximate yields that may be anticipated in temperate and insular climates such as British Isles; comparison of yield from hydrographic basin with rain falling on it.

The Intensity of Rainfall, J. W. Meares. Engineering, vol. 117, no. 3028, Jan. 11, 1924, pp. 40-42, 1 fig. partly on supp. plate. Intensity of rainfall and consequent run-off from catchment.

Variation in Annual Run-Off in the Rocky Mountain Region, R. Follansbee. U. S. Geol. Surv.—Water Supply Paper 520-A, Dec. 21, 1923, pp. 1-14, 4 figs. partly on supp. plates. Influence of topography.

RAPID TRANSIT

Chicago. Rapid Transit and Interurban Transportation for Chicago, B. I. Budd. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 142-147 and (discussion) 147-154. Present rapid transit facilities, and territory served; recommendations for improvement.

Financing of Systems. Detroit Rapid Transit Plant Financed by Direct Assessment. Eng. & Contracting (Railways), vol. 61, no. 1, Jan. 16, 1924, pp. 131-134. New basis for providing funds for proposed system of subways or elevated lines.

Suburban, New York City. Suburban Transit Plan Suggested for New York City. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, pp. 818-820, 1 fig. Independent subway system to connect with trunk-line railways outside of Manhattan Island; new streets proposed.

RAZORS

Blades, Heat Treatment. See ELECTRIC FURNACES, Heat-Treating.

REACTORS

Current-Limiting. Current-Limiting Reactors, W. M. Dann. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1050-1054, 6 figs. Considerations of factors affecting reliability; early weaknesses and means taken to eliminate them.

Direct-current Reactor Design, D. C. Prince. Gen. Elec. Rev., vol. 27, no. 6, June 1924, pp. 380-383, 8 figs. Discusses design of direct current, or smoothing, inductances. Use of such devices in a rectifier circuit reduces to a very considerable extent current variations.

Iron-Core. Theory of D-C Excited Iron-Core Reactors and Regulators, A. Boyajian. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 958-966, 46 figs. Application as frequency multiplier, as series current-limiting reactor, as feeder-voltage regulator, and as shunt reactor for power-factor control; ratio of controlling and controlled kva.

Saturated-Core. See VOLTAGE REGULATION, Regulators.

REAMERS

Inserted-Blade. Development of Tools Provides Simpler Ways for Performing Specific Operations, W. L. Carver. Automotive Industries, vol. 51, no. 12, Sept. 18, 1924, pp. 524-525, 8 figs. Describes reamer having die-cast head and high-speed steel cutter blades, new line of adjustable shell reamers which makes use of five sizes of blade, and improved system of jig bushings.

Taper. Taper Machine Reamers, F. Cooke. Machy. (Lond.), vol. 24, no. 613 and 615, June 26 and July 10, 1924, pp. 385-388 and 449-452, 13 figs. June 26: Deals with back piloting roughing reamers and finishing reamers; gives dimensions and formulas. July 10: Motion of a reamer; positive value; natural and negative value teeth; stability from spiral teeth.

RECLAMATION

British Columbia. Sumar Dyking and Reclamation Project of the B. C. Government, M. Montgomery. Contract Rec. & Eng. Rev., vol. 38, nos. 3 and 4, Jan. 16 and 23, 1924, pp. 48-50 and 74-76, 6 figs. Present status of scheme for reclaiming area known as Sumas Lake and protecting, by dyking, area known as Sumas Prairie, which had always been inundated when Fraser River was in flood. It is, in the main, a pumping proposition using special electrically-driven equipment; describes equipment.

California. California Reclamation District No. 2047, S. E. Gamble. Eng. & Contracting (Water Works), vol. 61, no. 1, Jan. 9, 1924, pp. 78-81, 3 figs. Particulars of drainage system in Glenn and Colusa counties in Sacramento Valley, supplemented by high-capacity pumping plant reversible for irrigation use.

Dredging and. Dredging and Land Reclamation, E. Latham. Engineering, vol. 138, no. 3065, Sept. 26, 1924, pp. 437-438. Methods and calculations for combined dredging and land reclamation; discusses whether it is cheaper to take sludge to sea or dump it ashore; scale of pay should be based on quantity of solid in proportion to quantity of water raised; examples of successes and failures.

Newlands Project, Drainage of. See DRAINAGE, Ditches.

Peat Land. The Swedish Peat Society and Its Work in Peat Land Reclamation, with Some Suggestions for Such Work in United States, H. Witte. Am. Peat Soc.—Jl., vol. 17, no. 1, Jan. 1924, pp. 9-14 and (discussion), 14-16. Rational utilization of peat bogs for agricultural purposes.

Swamp Land. Slag Is Scattered Hydraulically, J. D. Knox. Iron Trade Rev., vol. 74, no. 20, May 15, 1924, pp. 1301-1304, 6 figs. Swamp land of 150 acres in heart of iron and steel industry is being reclaimed by filling with granulated cinder; more than 150 hopper cars unloaded daily; hydraulic method employed.

Western United States. Notes on Western Reclamation, W. W. DeBerard. Eng. News-Rec., vol. 93, nos. 23 and 24, Dec. 4 and 11, 1924, pp. 898-900 and 948-950, 1 fig. Notes on changed conditions in reclamation. Dec. 4: Northern projects. Dec. 11: Southern projects.

RECTIFIERS

Argonal. Voltage Drop and Minimum Current in the Argonal Rectifier (Spannungsabfall und Minimalstromstärke des Argonal-Gleichrichters), M. Hellmuth. Elektrotechnische Zeit., vol. 45, no. 23, June 5, 1924, pp. 579-581, 3 figs. Gives characteristic curves for Argonal rectifier which works with an amalgam, containing sodium and potassium; this addition to mercury has effect of lowering value of minimum current with which rectifier can work, while glass is not attacked by alkali metals; figures and curves showing limiting values of current and voltage drop in Argonal type of rectifier.

Battery Charging with. See STORAGE BATTERIES, Charging.

Full-Wave. A Full Wave Rectifier, H. H. Dyer. Experimental Wireless, vol. 1, no. 12, Sept. 1924, pp. 728-730, 5 figs. Describes construction of full-wave rectifier from ex-W.D.D. III buzzer and gives details of operation.

Mercury-Vapor. Application of Mercury-Vapor Rectifiers to Traction (L'application des redresseurs à vapeur de mercure à la traction), J. Barthélémy. Revue Générale de l'Electricité, vol. 16, no. 12, Sept. 20, 1924, pp. 455-463, 9 figs. Particulars of Nation substation of Paris Metropolitan Railway Co., including electric equipment, distance control, and results of tests and operation under service conditions.

Development of Mercury-Vapor Current Rectifiers (Le développement industriel des redresseurs de courant à vapeur de mercure), F. Collin. Génie Civil, vol. 85, no. 8, Aug. 23, 1924, pp. 165-171, 17 figs. Discusses rectifiers for alternating current to direct current, including theory of monophase and polyphase rectifiers; details of construction and examples of application.

Effect of Direct Current Choking Coils on Power Factor of Alternating Current in Mercury-Vapor Rectifiers (Der Einfluss der Gleichstrom-Drosselspule auf den Leistungsfaktor des Wechselstromes beim Quecksilberdampf-Gleichrichter), W. Taeger. Elektrotechnische Zeit., vol. 45, no. 29, July 17, 1924, pp. 774-775, 1 fig. Shows that power factor of alternating current is not dependent in any way on size of cathode choking coils, but power factor changes with number of phases, is smaller in three-phase than in single-phase rectifiers.

High-Power Mercury-Arc Rectifiers, F. C. Bailey. Power, vol. 59, no. 4, Jan. 22, 1924, pp. 130-132, 6 figs. Construction and operation; auxiliary equipment; how rectifier is put into and taken out of service; parallel operation of rectifiers and rectifiers with other equipment; regulation, efficiency and power factor.

Large Scale Mercury-Vapor Rectifiers (Les redresseurs à vapeur de mercure à grand débit), H. Giroz. Revue Universelle des Mines, vol. 4, no. 5, Dec. 1, 1924, pp. 262-275, 6 figs. Discusses latest improvements in rectifiers and accessories and gives results obtained in operation, especially

in traction, rolling mill motors, hoisting apparatus, and d.c. transmission lines.

Mercury-Vapor Rectifiers (Les redresseurs à vapeur de mercure), M. Giroz. Société Française des Electriciens—Bul., vol. 4, no. 36, June 1924, pp. 463-513, 10 figs. Theory and operation; working in parallel of several groups; calculation of power factor; description of several plants of note. Bibliography.

Mercury-Vapor Rectifiers (Les Redresseurs à Vapeur de Mercure en verre), V. Sylvestre. Houille Blanche, vol. 23, nos. 87-88 and 91-92, Mar.-Apr. and July-Aug. 1924, pp. 52-57 and 117-132, 38 figs. Mar.-Apr.: Deals with low-capacity rectifiers, discussing regulation of tension, parallel operation, efficiency and power factor, applications and advantages. July-Aug.: Deals with high-capacity rectifiers, discussing accessories, including transformers, excitation, vacuum pumps, device for measuring vacuum, refrigeration, etc.; parallel working; regulation of tension; maintenance; efficiency and power factor. Contains table giving data on principal French installations of Brown-Boveri mercury-vapor rectifiers. Bibliography.

Method of Calculating Mercury-Vapor Rectifiers (Méthode générale de calcul des redresseurs à vapeur de mercure), M. Demontvignier. Revue Générale de l'Electricité, vol. 15, no. 12, Mar. 22, 1924, pp. 493-499, 1 fig. Author shows that it is possible to derive general equations of rectified current based on theory of rectifier; by making certain assumptions it is shown that equation of characteristic can be obtained in simple and sufficiently accurate form.

Overvoltages in Mercury-Vapor Rectifiers and Their Causes (Ueberspannungen an Quecksilberdampfgleichrichtern und ihre Ursache), A. Günther-Schulze. Zeit. für technische Physik, vol. 5, no. 4, 1924, pp. 132-135. Results of tests to determine cause of overvoltages occurring in rectifier installations in very cold rooms; disruptive strength of vapor increases as vapor pressure decreases; mercury flask therefore becomes harder and more liable to destruction by discharge as temperature falls.

Power Factor of Mercury Vapor Rectifiers (Der Leistungsfaktor der Quecksilberdampf-Gleichrichter), G. W. Müller. Elektrotechnische Zeit., vol. 45, no. 24, June 12, 1924, pp. 624-626, 14 figs. Explains and calculates power factors; gives curves of power factors based on measurements of existing mercury vapor rectifier plants.

Recent Mercury-Vapor Rectifier Plants (Neuere Quecksilberdampf-Gleichrichter-Anlagen), M. Hentschel. Glasers Annalen, vol. 95, no. 1, July 1, 1924, pp. 9-14, 14 figs. Details of construction of glass and metal rectifiers, single-phase and six-phase; 330 kw. rectifier plant for 700 volt; large scale rectifier plant of 720 kw. built by Siemens Schuckert.

Some Properties of Mercury-Vapor Rectifiers (Quelques propriétés des redresseurs à vapeur de mercure), M. Demontvignier. Revue Générale de l'Electricité, vol. 16, no. 13, Sept. 27, 1924, pp. 506-515, 16 figs. Examples of application of polyphase mercury-vapor rectifiers with symmetric magnetic coupling between anodes.

Rare-Gas-Filled Tubes as. Rare-Gas-Filled Tubes as Rectifiers (Die Verwendbarkeit von Edelgasgleichrichtern in der Schwachstromtechnik), K. Lorenz. Elektrotechnik u. Maschinenbau, vol. 42, no. 11, Mar. 16, 1924, pp. 157-160, 7 figs. Experimental research work by author has led to circuits containing two tubes, ordinary telephone condensers of 2 mf. and choke coils, which give in derivation of 110-volt or 220-volt a.c. supply a perfectly uniform direct current which may be used readily for operation of telegraphs or telephones instead of batteries; with proper adjustment of auxiliaries resulting current may supplant batteries even for closed-circuit systems.

Rectigon. Testing and Operation of Rectigon Rectifiers, S. B. Kraut. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 363-368, 15 figs. Discusses application of rectigon rectifiers to charging radio, automobile and telephone batteries, for tripping circuit breakers, for operating electric hammers, time clocks, relays, etc.; difference in types of rectigons.

Rotary. A Simple Rotary Rectifier, A Butement. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 658-662, 9 figs. Describes rotary rectifier which is useful for obtaining direct current from alternating current mains for accumulator charging, etc.

Storage-Battery Charging. Rectifiers for Charging Small Accumulators (Raddrizzatori di corrente per carica di piccoli accumulatori), Regnoni and Faloci. Rivista Tecnica delle Ferrovie Italiane, vol. 26, no. 5, Nov. 15, 1924, pp. 146-157, 14 figs. Discusses types of rectifiers, including mechanical, electrolytic, mercury-vapor, and incandescent cathode, and application to charging of storage batteries.

Thermionic-Valve. Obtaining Steady High-Voltage Direct Current from a Thermionic Rectifier Without a Filter, F. W. Maxstadt. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1055-1057, 5 figs. Describes special type of a.c. generator which gives proper low-voltage wave from rectification as a more nearly smooth direct potential.

Thermionic Valve Rectifiers, C. T. Melling. Engineer, vol. 137, no. 3571, June 6, 1924, p. 638, 5 figs. Shows how valves may be used for rectifying single and polyphase currents. (Abstract.) Metropolitan-Vickers Gaz., Apr. 1924.

Wave Forms. Rectifier Wave Forms, D. C. Prince. Gen. Elec. Rev., vol. 27, no. 9, Sept. 1924, pp. 608-615, 13 figs. Various factors influence output wave form of rectifiers, and a knowledge of how to adjust them properly is essential to obtain best service. Presents information to this end. Necessary fundamental formulas are supplemented by simple tables for convenience in calculation.

REDUCTION GEARS

Calculations. Reduction Gearing, M. Delaporte. Mar. Engr., vol. 47, no. 565, Oct. 1924, pp. 371-373, 6 figs. Some interesting opinions on the subject. (Abstract.) Translation of paper read before Association Technique Maritime et Aéronautique.

Lentz Hydraulic. See LOCOMOTIVES, Diesel-Engined.

Marine Steam-Turbine. Marine Turbine Reduction Gearing, Geo. G. Goodwin. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 548-549. (Abstract.) Lecture delivered before Instn. Mech. Engrs.

Turbine Reduction Gearing and Its Production, R. J. McLeod. Instn. Mech. Engrs.—Proc., no. 4, July 1924, pp. 633-659, 22 figs. Discusses general questions governing design and methods of production, from manufacturer's standpoint.

Shock-Absorbing. Shock-Absorbing and Concentric Speed Transformer. Engineering, vol. 117, no. 3038, Mar. 21, 1924, pp. 378, 7 figs. System combining speed reduction obtainable with epicyclic gear, with use of shock-absorbing characteristics of helical springs.

Stresses. Speed Reduction Gears (Considerations sur les réducteurs de vitesse à engrenages), M. Delaporte. Bul. Technique du Bureau Veritas, vol. 6, no. 9, Sept. 1924, pp. 176-179, 7 figs. Calculation of stresses, and shape of teeth; describes an elastic transmission to overcome torsional deformation.

Types. Transmitting Power Through Speed Reducers. Can. Machy., vol. 32, no. 21, Nov. 20,

1924, pp. 25-26, 7 figs. Describes worm, helical, herringbone, and spur gear reducers manufactured in Toronto plant of Hamilton Gear & Machine Co.

Worm. Worm Gear: Its Production and Efficiency and Its Application to Turbine Reduction Gearing, F. W. Lanchester. Engineering, vol. 117, no. 3031, Feb. 1, 1924, pp. 131-132. Author is not impressed with prospects of general use of worm gear as turbine reduction gearing. Report on efficiency tests made on work and worm wheel for Daimler Co. is appended.

REFLECTORS. See LIGHTING, Reflectors.

REFRACTORIES

Aluminous. The Laboratory Testing of Aluminous Refractories, R. F. Geller. Am. Ceramic Soc. —Jl., vol. 7, no. 9, Sept. 1924, pp. 663-669, 2 figs. Data obtained from tests on eight brands of high alumina refractories and two brands of fireclay refractories, used by the trade under conditions of service requiring resistance to corrosive action of lime and cement clinker at high temperatures.

Artificial Sillimanite. Artificial Sillimanite as a Refractory, H. Wilson, C. E. Sims and F. W. Schroeder. Am. Ceramic Soc.—Jl., vol. 7, nos. 11 and 12, Nov. and Dec. 1924, pp. 842-855 and 907-919, 12 figs. Mineralogical and chemical properties; past investigations of sillimanite; study of refractory properties of electrically-fused silica and alumina mixtures, including results of tests. Resistance of refractories to load at high temperatures. Pub. by permission U. S. Bur. Mines.

Preparation of Artificial Sillimanite for Refractory Uses, C. E. Sims, H. Wilson and H. C. Fisher. Am. Electrochem. Soc.—Advance Paper no. 22, for meeting Oct. 2-4, 1924, pp. 327-343, 8 figs. partly on supp. plates. Describes experimental work leading to adoption of a furnace for preparation of artificial sillimanite. Raw materials, and characteristics.

Brick. See BRICK, Refractory.

Carborundum. Physical Characteristics of Specialized Refractories—Thermal Conductivity of Carborundum Refractories, M. L. Hartmann and O. B. Westmont. Am. Electrochem. Soc.—Advance Paper no. 21, for meeting Oct. 2-4, 1924, pp. 287-312, 13 figs. Details of tests made.

Cement Kilns. See KILNS, Cement.

Cements. High Temperature Cements, J. H. Kruson. Combustion, vol. 11, no. 1, July 1924, pp. 51-56, 5 figs. Results of tests of 18 cements and 5 clays with relation to furnace requirements.

Checker Brick. Checker Brick for Resisting Alkaline Slags, M. C. Booze and F. C. Flint. Am. Ceramic Soc.—Jl., vol. 7, no. 8, Aug. 1924, pp. 594-598, 2 figs. In glass tank furnace, amount of corrosion varied directly with silica content of brick; those highest in alumina gave excellent service in regenerator operating at low temperature.

Chrome. See Open-Hearth Furnaces.

Clay. Progress in the Manufacture and Use of Clay Refractories, W. G. Owen. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 125-137. Discusses care in manufacture of brick, making brick to specific service requirements, brick for steel heat-treating furnaces.

See also CLAY, Refractory.

Coal Ash, Effect on. The Effect of Coal Ash on Refractories, J. J. Brennan. Combustion, vol. 10, no. 6, June 1924, pp. 418-422, 4 figs. Report of a series of experiments with ash from nine different coals in connection with various kinds of firebrick. Contains number of charts.

Coke-Oven. Fireproof Brick for Furnaces and Coke Ovens (Feuerfeste Baustoffe für Feuerungen und Koksöfen). W. Soherr. Glückauf, vol. 60, no. 46, Nov. 15, 1924, pp. 1055-1063, 25 figs. Discusses increased boiler temperature and consequent difficulties in construction of furnace arches; production of refractories; choice of raw materials; microstructure; clay as a binder, testing of refractories; etc.

Refractory Products for Coke Ovens (Les produits réfractaires pour fours à coke), V. Bodin. Chimie & Industrie, special no., May 1924, pp. 415-429, 11 figs. Requirements of refractories for coke ovens and methods of testing; results of tests show that no one category of products is superior to the others in all respects.

Conductivity and Specific Heat. Conductivity and Specific Heat of Refractories at High Temperatures, M. D. Hersey and E. W. Butzler. U. S. Bur. Mines—Reports of Investigations, no. 2564, Jan. 1924, 7 pp. General statement of problem, with results on Georgia firebrick to 1700 deg. fahr.

Dolomite. See DOLOMITE.

Drying. Improvements in Drying Refractories or Other Goods, J. Holland and W. J. Gardner. Ceramic Soc.—Trans., vol. 23, part 1, 1924, pp. 16-20 and (discussion) 20-25, 6 figs. Describes method of drying silica bricks, or other refractories, by means of a stove which is heated by gases and products of combustion radiating through floors and side walls, while goods are slowly transported through stove on wrought iron plates running over a tram-way, machinery for this motion being fixed at front of stove and worked by means of a worm shaft connected with main drive of mill.

Notes on the Proctor Dryer, A. H. Middleton. Ceramic Soc.—Trans., vol. 23, part 1, 1924, pp. 51-58 and (discussion) 58-60, 8 figs. Used for drying all sorts of materials such as soap, tobacco, and leather, as well as refractory materials. Is essentially a closed heated chamber, atmosphere of which is dry at one end and of high humidity at other; fresh atmospheric air is drawn in and dried goods are taken out at one end; wet goods are put in at other end and moisture-laden air from goods is drawn off some distance from this end.

Electric-Brass-Furnace. The Electric Brass Furnace Refractory Situation, H. W. Gillett and E. L. Mack. Am. Ceramic Soc.—Jl., vol. 7, no. 4, Apr. 1924, pp. 288-299, 5 figs. Describes the three prominent types of electric brass furnaces, and outlines conditions which they impose on refractories. Limitations which properties of refractories place on applicability of the various furnaces, and lines along which development and improvement are most likely to take place. (Pub. by permission U. S. Bur. Mines.)

Electric Resistivity. The Electrical Resistivity of Refractories, A. V. Henry. Am. Ceramic Soc. —Jl., vol. 7, no. 10, Oct. 1924, pp. 764-782, 13 figs. Determination of electrical resistivities of flint fireclay, kaolin, magnesite, sillimanite, silica, diaspore, and talcs at temperatures up to 1500 deg. cent.

Firebrick. See FIREBRICK.

Fireclays. See FIRECLAYS.

Furnace. See Coke-Oven.

Furnace Linings. See BOILER FURNACES, Linings.

Gas-House. Fireclay and Silica Brick as Gas House Refractories, A. F. Greaves-Walker. Gas Age-Rec., vol. 53, no. 17, Apr. 26, 1924, pp. 567-570. Notes on manufacturing methods, requirements of gas-house refractories, causes of air leaks and breaks, etc.

See also GAS MANUFACTURE, Retorts.

Glass-Furnace. Notes on the Behavior of Refractories in Glass Melting Furnaces, H. Insley. Am. Ceramic Soc.—Jl., vol. 7, no. 8, Aug. 1924,

pp. 583-593, 7 figs. Concludes that high alumina refractories would resist solvent action of glass and fluxing action of soda in furnace atmosphere better than fire clay refractories.

The Casting Process for Glass-house Refractories in German Glass Plants, K. Endell. Soc. Glass Technology—Jl., vol. 8, no. 29, Mar. 1924, pp. 57-66 and (discussion) 66-69, 3 figs. partly on supp. plate. What is being done in Europe in the matter of producing refractories for glass works by casting process.

High-Temperature, Bonding. Bonding High-Temperature Refractories, R. C. Gosreau. Chem. & Met. Eng., vol. 31, no. 18, Nov. 3, 1924, pp. 696-698. Results of practical study designed particularly to aid electric-furnace operator in selecting satisfactory bonding materials for use in patching, fettling, and making monolithic linings.

Oil-Gas Generators. Refractories for Oil Gas Generators, J. T. Creighton and M. J. Cereghino. Gas Age-Rec., vol. 54, nos. 24, 25, and 26, Dec. 13, 20, and 27, 1924, pp. 826-828, 860-862, and 894-896, 7 figs. Progress report of investigation made by California gas companies to determine chemical and physical characteristics of various kinds of firebrick, and relation of these characteristics to actual results realized in practice.

Open-Hearth Furnaces. Chrome Refractories for the Open Hearth, R. E. Griffith. Am. Ceramic Soc.—Jl., vol. 7, no. 9, Sept. 1924, pp. 690-698. Compilation of notes on chrome ore, and various forms in which it is used in open-hearth furnaces, with discussion of recent improvements in chrome brick that have permitted their broader use; performance data.

Observations on Requirements of Refractories for Open Hearth, F. W. Davis and G. A. Bole. Am. Inst. Min. & Met. Engrs.—Trans., no. 1312-S, Mar. 1924, 10 pp. Deals with certain of necessary requirements of refractories for open-hearth furnace; refractories in common use for different parts are discussed both as to service they are giving and their suitability to withstand existing chemical, thermal, and physical requirements; relation between service and allowable cost of refractory; suggestions on these points.

Roof Brick for the Open Hearth, H. C. Harrison. Am. Ceramic Soc.—Jl., vol. 7, no. 9, Sept. 1924, pp. 608-705. Considers conditions under which roof brick has to stand and possible means of improving refractories in common use; possibility of utilizing other available refractories.

Some Considerations Necessary in Selection of Refractories for the Open Hearth, S. Cornell. Am. Ceramic Soc.—Jl., vol. 7, no. 9, Sept. 1924, pp. 670-681. Discusses kind, quality, and quantity of refractory brick used in steel-plant furnaces, coke ovens, blast furnace, open-hearth, and auxiliaries; factors that influence life of refractory brick in open-hearth furnace, with economic situation indicated in monetary value.

Properties. Selection Factors in Choosing Refractories for Industrial Plant Use, O. A. Hougen. Chem. & Met. Eng., vol. 30, no. 19, May 12, 1924, pp. 737-741. Basic facts upon which engineer must base his choice of refractory; includes table giving physical and chemical properties of refractory materials.

Refractoriness and Composition, Relation of. The Relation between Ordinary Refractoriness, Under-load Refractoriness and Composition, Physical and Chemical, of Refractory Material, A. J. Dale. Ceramic Soc.—Trans., vol. 23, part 3, 1923-24, pp. 217-233, 11 figs. Details and results of experiments. Reprinted by permission Brit. Refractories Research Assn. from Bul. no. 5, Dec. 1923.

Refuse Firebrick, New Use for. New Use for Refuse Refractory Material, S. F. Walton. Iron Age, vol. 113, no. 11, Mar. 13, 1924, pp. 786-788, 4 figs. Old fireclay brickbats ground up with bond to form highly refractory mortar; cost reported low.

Research Committee Report. Report of Refractory Materials Joint Research Committee. Gas. Jl., vol. 167, no. 3191, July 9, 1924, pp. 17-36 and (discussion) 36-38 (supp.), Contains abstracts of following papers: Storage of Silica Refractories, W. J. Rees; Relation Between Ordinary Refractoriness, Under-Load Refractoriness, and Composition, Physical and Chemical, of Refractory Material, A. J. Dale, 11 figs.; Refractoriness Under Load, J. W. Mellor, 2 figs.; Sedimentation as a Means of Purifying Clay, S. R. Hind; Effect of Repeated Burning on Structure and Properties of Lime-Bonded Silica Bricks, W. Hugill and W. J. Rees, 10 figs.; Some Causes of Variation in Sizes of Refractories—Bricks and Block, J. W. Mellor, 3 figs.; Thermal Conductivity and Some Other Properties of Two Commercial, Heat-Insulating Bricks Used in Kiln Construction, A. T. Green, 5 figs.; Influence of Texture on Transmission of Heat Through Firebricks, A. T. Green, 12 figs.

Silica. Common Sense and Common Refractories, M. C. Booze. Chem. & Met. Eng., vol. 31, no. 26, Dec. 29, 1924, pp. 1003-1005, 1 fig. Analysis of possible future developments in fireclay and silica refractories; practical limitations on quality of product.

Silica Brick. See SILICA BRICK.

Sillimanite. See Artificial Sillimanite.

Testing. The Softening Test and Its Possibilities (Der Erweichungsversuch und seine Möglichkeiten), H. Hirsch. Berichte der Deutschen Keramischen Gesellschaft, vol. 5, no. 3, Sept. 1924, pp. 65-86, 23 figs. Describes methods and apparatus used in softening test as used in United States, England, and Germany, and gives examples.

Thermal Conductivity. Studies on the Thermal Conductivities of Some Refractory Materials. Am. Seramic Soc.—Jl., vol. 7, no. 1, Jan. 1924, pp. 19-28, 2 figs. Describes tests made for purpose of obtaining reliable conductivity coefficients on several types of refractory bricks made from ceramic bonded electric-furnace products, and results obtained; description of apparatus used.

Thermal Conductivity of Refractory Materials (Sur la conductibilité thérmique des matériaux refractaires), P. Gilard. Revue Universelle des Mines, vol. 4, no. 1, Oct. 1, 1924, pp. 34-50, 5 figs. Discusses heat transmission and its determination. Tests show that heat transmission increases with temperature. Bibliography.

Tube-Mill Lining. Domestic Tube-mill Lining Successfully Meets Foreign Competition, W. M. Weigel. Eng. & Min. Jl.-Press, vol. 118, no. 24, Dec. 13, 1924, pp. 925-928, 5 figs. Production of siliceous blocks for linings, at Jasper, Min., replacing product formerly imported from Europe, mostly from Belgium.

REFRIGERANTS

Ammonia. See AMMONIA.

Ethyl Chloride. The Thermal Properties of Ethyl Chloride, C. J. Jenkin and D. N. Shorthose. Refrig. Eng., vol. 10, no. 8, Feb. 1924, pp. 313-318, 3 figs. Results of research carried out at Eng. Lab. in Oxford for Eng. Committee of Food Investigation Board. From Special Report No. 14 of Dept. Sci. & Indus. Research of Great Britain. See also Ice & Refrigeration, vol. 66, no. 4, Apr. 1924, pp. 347-348.

Evaporating Systems for. Evaporating Systems for Refrigerants, W. F. Davis. Ice & Refrigeration, vol. 66, no. 1, Jan. 1924, pp. 7-10 and (discussion) 10-12. See also Refrig. World, vol. 59, no. 1, Jan. 1924, pp. 23-24. Past and present evaporators; details of design; foundation for evaporators; purifying refrigerant.

Low-Pressure. Low-Pressure Refrigerants, H. D. Edwards. Universal Engr., vol, 40, no. 5, Nov. 1924, pp. 24-27, 2 figs. Consideration of the different chemicals used, and of lubrication problem. Abstract of paper read before Nat. Assn. Practical Refrig. Engrs.

Methyl Chloride. A Heat Chart for Methyl Chloride, T. M. Gunn. Refrig. Wld., vol. 59, no. 7, July 1924, pp. 15-18. Advantages and properties of methyl chloride and explanation of chart; with diagram more common problems of refrigeration may be worked out almost without calculation.

Natural-Gas Gasoline. Use of Highly Volatile Natural Gas Gasoline as a Refrigerant, L. D. Wyant. South. Engr., vol. 42, no. 3, Nov. 1924, pp. 55-58, 2 figs. Results of experimental runs using gasoline as a refrigerant.

Organic Brines. Organic Refrigerating Brines, H. F. Zoller. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1073-1075, 1 fig. Deals with non-aqueous and aqueous brines; factors affecting choice of brine; advantages of alcohol-water mixture; summarizes advantages of certain organic refrigerating brines of methyl-ethyl alcohol or glycerol type over inorganic chloride brines.

Properties. Properties of Refrigerants, H. D. Edwards. Refrig. Eng., vol. 11, no. 3, Sept. 1924, pp. 95-116, 20 figs. Report containing data on physical properties, effect on various lubricants, effect on human life or health, inflammability, explosive qualities, method of testing purity, precautions essential in handling, etc.

Sulphur Dioxide. Thermal Properties of Sulphur Dioxide, D. L. Fiske. Refrig. Eng., vol. 10, no. 6, Dec. 1923, pp. 197-200 and 204, 3 figs. Work undertaken to derive results to cover properties of superheated and saturated regions with a thermodynamically consistent set of equations.

Thermodynamics of. Comparison of Thermodynamic Characteristics of Various Refrigerating Fluids, W. H. Carrier and R. W. Waterfill. Refrig. Eng., vol. 10, no. 12, June 1924, pp. 415-424, 12 figs. Comparison and analysis of refrigerating cycles of various fluids using ideal Carnot cycle as standard, also their adaptibility for positive or centrifugal compression.

REFRIGERATING MACHINES

Absorption. The Absorption Ice Machine, H. A. Cranford. Southern Engr., vol. 40, no. 6, and vol. 41, nos. 1 and 2, Feb., Mar., and Apr., 1924, pp. 38-42, 38-40, and 57-59, 10 figs. Pointers on purchasing; the various apparatus comprising the system; handling aqua-ammonia pump; packing, gaskets and supplies. What to do when overhauling the system and how to handle the various apparatus.

Air. The Use of Cold Air as a Refrigerating Agent, M. Leblanc. Refrig. Eng., vol. 10, no. 8, Feb. 1924, pp. 309-313, 3 figs. Application to freezing of ice; decided departure from beaten path described and advantages of such a system enumerated and substantiated with figures. From Revue Générale du Froid, Dec. 1922.

Autofrigor. The "Autofrigor" Refrigerating Machine. Engineering, vol. 117, no. 3030, Jan. 25, 1924, p. 104, 4 figs. Small cold-storage apparatus suitable for private users, shopkeepers, etc.; is perfectly self-contained piece, electrically driven, and adaptable to practically any type of cold cupboard or chamber.

British Empire Exhibition. Refrigerating Machines at the British Empire Exhibition. Engineering, vol. 118, nos. 3068 and 3068, Oct. 17 and 24, 1924, pp. 559-563 and 594, 26 figs. Details of various types.

Compressors. Lubrication of Refrigeration Compressors, A. F. Brewer. Power, vol. 59, no. 14, Apr. 1, 1924, pp. 524-525. Discusses lubrication requirements of respective machinery of CO_2, sulphur dioxide, ethyl and methyl chlorides, and propane when used as refrigerants.

The Carbon Dioxide Compressor, H. J. Macintire. Refrig. Wld., vol. 59, no. 6, June 1924, pp. 16-18, 2 figs. Improvements in recent years have followed along same lines as in ammonia compressor design.

Compression. Recent Improvements in Refrigerating Apparatus, F. Ophuls and G. A. Horne. Refrig. Eng., vol. 2, no. 1, July 1924, pp. 1-13, 8 figs. Deals with that part of ammonia-compression refrigerating system in which ammonia is transferred to compressor, from there to condenser, then to receiver and finally liquid is returned to expansion, pressure reducing, or liquid regulating valves of system.

The Advent of the Compound Compression Refrigerating System, L. J. Sforzini. Power, vol. 60, no. 5, July 29, 1924, pp. 172-174, 4 figs. Describes one of the latest arrangements of compound compression system of refrigeration; shell-and-tube equipment employed for intercooler, gas precooler, condensers and brine coolers, all this apparatus proper being without a single gasketed joint. Notes on four other methods of compound compression. Condensing operation. Steam consumption with different pressures.

Ethyl-Chloride. An Ethyl Chloride Refrigerating Compressor, R. G. Reid. Ice & Cold Storage, vol. 27, no. 311, Feb. 1924, pp. 27-30, 3 figs. The ideal refrigerant; pros and cons of ethyl chloride; describes Peter Brotherhood, Ltd., vertical single-cylinder two-stage uniflow machine.

Packing for. Packing for Refrigerating Machines, B. E. Seamon. South. Engr., vol. 41, no. 7, Sept. 1924, pp. 39-41. Requirements of suitable packing for rod stuffing boxes on refrigerating machines.

Precooling in. Pre-Cooling by Primary Evaporation and Multiple Effect Compression, as Applied to CO_2 Refrigerating Machines, Henry Brier. Cold Storage, vol. 27, no. 315, June 19, 1924, pp. 246-248, 6 figs. Shows that multiple-effect compression is preëminently suited for dealing satisfactorily with two evaporations in closed cycle of CO_2 refrigerating plant arranged for precooling by partial or primary evaporation.

Sleeve-Valve. A New Standard in Compressor Design. Cold Storage, vol. 27, no. 320, Nov. 20, 1924, pp. 462-463. Describes refrigerating machine of entirely novel and revolutionary design, invented by E. Prestage, of London, and now being built by H. J. West & Co., Ltd., Lincoln, for which remarkable efficiency is reported; compressors are of vertical enclosed single-acting type.

Small Domestic. Small Domestic Refrigerating Machines, Chas. Schlumberger. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 907-908. Describes types on European market as demonstration of his claim that problem of designing and building small domestic refrigerating machines has been solved.

Throttle Expansion. On the Coefficient of Performance of Refrigerating Machines employing Throttle Expansion, A. W. Porter. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 287, Nov. 1924, pp. 1006-1010, 2 figs. When comparison is made between two cases of mechanical refrigeration in one of which cooling is produced by cylinder expansion and in other by throttle expansion, but all other conditions the same in both, coefficient of performance is less in throttle case than in other for two reasons: (1) more work is required to keep fluid in circulation, (2) less heat can be removed from cold stores.

Types. Modern Refrigerating Machines, R. G. Reid. Inst. Mar. Engrs.—Trans., vol. 35, Feb.

1924, pp. 570-601 and (discussion) 601-607, 6 figs. Shows factors which have influenced adoption of high-speed compressor, describes some particular machines, and presents summary of tests taken from such machines on test bed in actual service.

REFRIGERATING PLANTS

Automatic, Electricity in. Electricity in Automatic Refrigeration, W. Deans. Refrig. Eng., vol. 10, no. 9, Mar. 1924, pp. 335-344 and 348-349, 4 figs. Character of load on motor; types, selection, control, and protection of motors; describes automatic plant.

Brine Coolers. See AMMONIA CONDENSERS, Brine Coolers and.

Brine Hold-Over Tanks. Heat Transfer in Brine Hold-Over Tanks, Chas. H. Herter. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 563-565, and Refrig. Eng., vol. 10, no. 10, Apr. 1924, pp. 370-371, and 375. Three types of hold-over tanks; how to calculate size of congealing tank.

Cooling Towers. See COOLING TOWERS.

Development. See ICE PLANTS, Development.

Electric Equipment Control. Control of Electrical Equipment in Refrigerating Plants, H. P. Hill. Ice & Refrigeration, vol. 66, no. 1, Jan. 1924, pp. 22-26, 3 figs. Discusses transformers, starting of synchronous motors, keeping ice plant in continuous operation, etc.

Equipment Specifications. Elimination of Defective Materials and Workmanship, W. H. Metcalf. Ice & Refrigeration, vol. 67, no. 2, Aug. 1924, pp. 87-90. Discusses lines on which specifications may be compiled to enable contractors to quote on their standard plant and to enable purchaser to make comparison.

Fish-Freezing. A Modern Fish Freezing Plant, P. W. Petersen. Refrig. Eng., vol. 10, no. 12, June 1924, pp. 425-431, 10 figs. Describes Petersen methods using brine tanks, the brine not coming in contact with the fish, however; gives results obtained. See also Ice & Refrigeration, vol. 67, no. 2, Aug. 1924, pp. 103-108, 10 figs. and Ice & Cold Storage, vol. 37, no. 317, Aug. 1924, pp. 207-212, 5 figs.

Heat Transmission in. Heat Transmission, A. G. Clausen. Cold Storage, vol. 27, no. 321, Dec. 18, 1924, pp. 503-505 (includes discussion), 3 figs. Efficiency factors in refrigerating system. Abstract of paper read before Brit. Cold Storage & Ice Assn.

High-Speed Compressor Installation. Refrigerating Plant with High-Speed Ammonia Compressors. Engineering, vol. 117, no. 3028, Jan. 11, 1924, pp. 42-43, 9 figs. partly on p. 50. New plant installed for Blackfriars Cold Storage Co. is said to be interesting not only because of great compactness of arrangement, but also in respect to design of compressors employed, of vertical high-speed type.

Ice-Cream. World's Largest Ice Cream Plant, T. Mitchell. Refrig. Wld., vol. 59, no. 7, July 1924, pp. 11-14 and 36, 15 figs. Illustrated description of Breyer Ice Cream Co.'s new plant in West Phila., Pa., equipped to make 14,000,000 gal. a year.

Pressures and Temperatures. Pressures and Temperatures in the Refrigerating Plant, G. Grow. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 768-769, 2 figs. Shows influence of suction pressure on power required by compressor; points out that influence of superheat in suction is often ignored; discharge pressure is dependent upon temperature of cooling water.

Radiators, Cast-Iron Sections. Heat Transfer in Cast Iron Radiator Sections for Ammonia, H. J. MacIntire. Refrig. Eng., vol. 11, no. 6, Dec. 1924, pp. 195-199 and (discussion) 199 and 205-206, 6 figs. Account of tests on cold-storage box 12 ft. by 15 ft. with evaporative surface placed on side walls, in order to secure information as to relative advantages of cast-iron radiator sections as compared with piping.

Research Plant. Refrigeration for Research Work, S. R. Winters. Ice & Refrigeration, vol. 67, no. 1, July 1924, pp. 14-15, 2 figs. Describes experimental refrigerating plant at Bur. Animal Industry of U. S. Dept. Agriculture, Washington, D. C.; considerations of temperatures required; description of equipment; improvement of foods due to research work.

Rules and Formulas for. Some Rules and Formulae for the Refrigeration Engineer, W. H. Motz. Refrigerating Eng., vol. 11, no. 2, Aug. 1924, pp. 51-56 and (discussion) 56-60 and 64-65. Gives general rules and formulas concerning mechanical equipment of ice-making and refrigerating plants; rules pertain to displacements, speeds, and power requirements of compressors; heat removed in condensers; water and surface requirements for condensers; capacities of ammonia receivers; refrigerating coils in air, evaporators for refrigerating liquids; quantity of brine and power requirements of brine circulation systems; refrigeration pipe, cans per ton of ice.

Tests. Additional Data Regarding the Reliability of Fluid Meters in Refrigerating Tests, L. S. Morse. Refrig. Eng., vol. 10, no. 11, May 1924, pp. 385-398 and (discussion) 398-404, 12 figs. Results of comparisons and calculations of orifice, brine venturi, water venturi, and ammonia venturi meters.

REFRIGERATION

Absorption System. The Absorption Refrigerating System, H. J. MacIntire. Power, vol. 59, no. 11, Mar. 11, 1924, pp. 399-401. Competition of compression system; refrigeration calculations; heat taken up in absorber.

Air-Cooling Plant. See AIR COOLING.

Ammonia Chart. Refrigeration and the Ammonia Chart, D. L. Fiske. Ice & Refrigeration, vol. 66, nos. 1, 2, and 6, and vol. 67, no. 1, Jan., Feb., June, and July, 1924, pp. 86-78, 185-187, 543-545, and 36-37, 9 figs. Compound and multiple effect of compression; use of ammonia chart; testing of refrigeration machinery; rational basis for development of thermodynamic tables of properties of refrigerants; specific properties desired computed by thermodynamic laws; analysis of experimental data; properties of saturated and superheated vapors; development of equations; etc.

Ammonia Radiators. See RADIATORS, Ammonia.

Ammonia Tables, Use of. Using the Ammonia Tables, J. E. Starr. Power, vol. 60, no. 3, July 15, 1924, pp. 91-92. Gives tables showing properties of saturated and superheated ammonia—saturated-ammonia table containing also gage pressure—and explains their use.

Bakeries. See BAKERIES.

Brine and Direct-Expansion Cooling. Comparison of Direct Expansion and Brine in Applying Refrigeration, H. J. Macintire. Chem. & Met. Eng., vol. 30, no. 26, June 30, 1924, pp. 1027-1029, 4 figs. Conditions governing application of cooling by two methods, with particular emphasis on brine cooling.

Brine Spray Systems. Brine Spray Refrigerating Systems, S. C. Bloom. Ice & Refrigeration, vol. 66, no. 5, May 1924, pp. 476-478, 2 figs. Considerations pertaining to design and operation; types of brine systems; a typical plant. Abstract of paper read at Nat. Assn. Practical Refrig. Engrs. convention.

British Empire Exhibition. Refrigeration at Wembly. Power Engr., vol. 19, nos. 221 and 222, Aug. and Sept. 1924, pp. 308-311, and 346-348, 11 figs. Illustrated description of refrigerating plant actually performing useful functions at British exhibition.

Cold Storage. See COLD STORAGE.

Eggs. See EGGS, Preservation.

Electric. Electro-Mechanical Refrigeration, A. D. Mclay. Nat. Elec. Light Assn.—Bul., vol. 11, no. 3, Mar. 1924, pp. 155-158. Temperature observations of cellars and living rooms; summary of refrigerator temperature studies; vapair process; ice-cream cabinets; etc. Abstract of paper read before Nat. Elec. Light Assn.

Servicing Domestic Electric Refrigerators, H. E. Young. Elec. Wld., vol. 84, no. 22, Nov. 29, 1924, pp. 1149-1152. Experience data for 224 installations and factors involving successful promotion and sales methods, as reported to Nat. Elec. Light Assn.

Evaporated-Water. Refrigeration with Evaporated Water. Nautical Gaz., vol. 107, no. 3, July 19, 1924, p. 76 (tech. sec.), 3 figs. Details of new Westinghouse-Leblanc apparatus which does not require chemicals.

Food Industries. The Use of Refrigeration in the Food Industries (Köling anvendt i Levnedsmiddelindustrien), N. Jörgensen. Tekniske Forenings Tidsskrift, vol. 48, no. 11, Nov. 1, 1924, pp. 178-187, 8 figs. History. Description of various cooling systems and refrigerating machines, their use for cold storage and for manufacture of ice cream and chocolate. Refrigerator cars.

France. Some Recent Progress in the Refrigerating Industry in France (Sur quelques progrés récents de l'industrie frigorifique en France), L. Marchis. Technique Moderne, vol. 16, nos. 17 and 18, Sept. 1 and 15, 1924, pp. 565-577 and 604-615, 25 figs. Discusses compressors, including horizontal and vertical, single- and double-effect, rotary, multiple-stage, compressors for low-power refrigerators, high-power ammonia compressors, etc.; liquefiers and evaporators; flooded system, and liquid separators; insulators; transportation equipment used for importing and exporting cold-storage products; experiences on application of refrigeration to conservation of fish; Ottesen meat-freezing method; etc.

Fruits and Vegetables. Precooling of Fruits and Vegetables, J. W. Andrews. Ice & Refrigeration, vol. 67, no. 2, Aug. 1924, pp. 97-99, 1 fig. See also Refrig. Eng., vol. 11, no. 4, Oct. 1924, pp. 143-146 and 150, 1 fig. Discusses cooling before shipment, method and apparatus used.

Gas. Refrigerating With Gas, W. F. Schaphorst. Am. Gas Jl., vol. 121, no. 23, Nov. 8, 1924, pp. 1149-1150 and 1165-1167, 6 figs. Description of principles and practical installation.

Intermittent System. Intermittent System of Refrigeration, W. F. Schaphorst. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 347-348, 2 figs. Describes refrigerating system which may be operated on off-peak boiler loads.

Liquid-Oxygen. See LIQUID OXYGEN.

Meat and Fish. New Investigations on the Preservation of Meat and Fish by the Freezing Process. Ice & Cold Storage, vol. 27, no. 314, May 1924, pp. 114-116, 8 figs. Changes on tissue of interior organs, heart, liver, kidneys, and spleen that result from freezing process. From article by E. Kallert in Zeit. für die Gesamte Kälte Industrie.

Milk-Bottling Plants. Refrigeration for Milk Bottling Plants, J. B. Williams. Ice & Refrigeration, vol. 67, nos. 2 and 3, Aug. and Sept. 1924, pp. 100-102 and 171-175, 9 figs. Discusses properties of milk, specific heat and freezing point, cooling and bottling, pasteurizing, refrigeration requirements in handling milk, refrigeration for storage rooms; diagrammatical representation of work of refrigerating plant and necessary refrigerating duty, analysis of various heat quantities, coils for milk storage room, brine storage tanks, brine coolers, mechanical equipment and power requirements.

Mine Ventilation, Use in. See MINES, Ventilation.

Non-Condensable Gases. Non-Condensable Gases, B. E. Hill. Refrig. Eng., vol. 10, no. 10, Apr. 1924, pp. 372-375, 1 fig. Their causes and effects upon economical and efficient operation of an ice-making or refrigerating system.

Oil-Refining Industry. Oil Refinery Refrigeration, C. H. Herter. Refrig. Wld., vol. 59, no. 3, Mar. 1924, pp. 13-16. Data on important applications of refrigeration in various industries treating oils, fats, and greases.

Power and. Power and Refrigeration, O. B. Goldman. Ice & Refrigeration, vol. 67, nos. 1, 2, 3, and 4, July, Aug., Sept., and Oct., 1924, pp. 38-41, 116-117, 169-170, and 231-232, 13 figs. July: Gas changes; constant weight and constant volume change, weight and pressure change, constant weight and temperature change, pressure and volume change, pressure and temperature change and adiabatic changes. Aug.: Specific heat of gases; discussion of elementary cycles; gas refrigerating cycles; power requirements, coefficients of performance, relative efficiencies. Sept.: Relation between coefficients of performance and efficiencies; practical examples on air compressors, gas-refrigerator and Otto gas-engine cycles. Oct.: Carnot cycle; power requirements; relation of pressures and volumes; heat expenditures.

Transit Temperatures. Low Temperature in Transit, M. E. Pennington. Ice & Refrigeration, vol. 67, no. 5, Nov. 1924, pp. 323-325. Some findings of pomologist, plant pathologists, bacteriologists, and bio-chemists in investigating relation of fruit and vegetable rots, disease and fungus infections to temperatures maintained in transit, and of low bacterial counts and retardation of chemical decomposition as determined in animal and fish products when well handled at adequately low temperatures.

REFUSE

Collection. Collecting City Refuse. Pub. Wks., vol. 55, no. 3, Mar. 1924, pp. 81-83, 1 fig. Traction physics, collection requirements, and designing of collecting vehicles. Experiences of four municipalities in use of electric trucks for refuse collection: Time test of collection in Pasadena.

Garbage and Trash Collection Methods, C. H. R. Fuller. Can. Engr., vol. 47, no. 16, Oct. 14, 1924, pp. 425-427. Methods employed in various cities. Sanitary fill; hog feeding; reduction; incineration; cost of operating Chatham incinerator.

Modern Methods of Refuse Collection, J. A. Priestley. Surveyor & Mun. & County Engr., vol. 66, no. 1700, Aug. 15, 1924, pp. 143-144. See also Can. Engr., vol. 47, no. 18, Oct. 28, 1924, pp. 457-458, and Contract Rec., vol. 38, nos. 42 and 44, Oct. 15 and 29, 1924, pp. 1024-1025 and 1082. Describes English practice, including types of receptacles, frequency of collection, dust prevention, transport methods and street refuse.

Refuse Collection and Disposal Arrangements on the Continent, F. W. Cable. Surveyor & Mun. & County Engr., vol. 65, no. 1684, Apr. 25, 1924, pp. 407-408. Report of a recent tour of investigation, describing methods adopted in Paris, Berlin, and Magdeburg.

The Pagefield System of Refuse Collection. Engineering, vol. 118, no. 3071, Nov. 7, 1924, pp.

655-656, 8 figs., partly on p. 646. Essential feature is combined use of horse and motor transport; motor vehicle does long trips from point to point and horses can be employed for slow house-to-house delivery or collection.

Disposal. See REFUSE DISPOSAL.

Utilization. Fertilizing Experiments with Fine Ground Refuse and Bulk Fertilizers as a Starting Point for More Economic Utilization of Municipal Refuse, etc. (Düngeversuche mit Feinmüll und Mengedünger als Ausgangspunkt für eine wirtschaftlichere Verwertung der städtischen Abfallstoffe Hausmüll und Klärschlamm), J. Bodler. Gesundheits-Ingenieur, vol. 47, no. 26, June 28, 1924, pp. 266-279, 6 figs. Discusses results of Bavarian experiments during last ten years and emphasizes successful fertilizing trials, of which tables are given.

Refuse Power Works and Steam Production From Refuse (Müllkraftwerke und Dampferzeugung aus Müll), A. Reich. Gesundheits-Ingenieur, vol. 47, no. 36, Sept. 6, 1924, pp. 394-397, 1 fig. Discusses effective use of refuse, especially if mxed with better fuel, and describes cascade grate, Martin patent, of Vesuvio A. G., and its advantages.

Thermotechnical Utilization of Refuse (Die wärmetechnische Ausnutzung des Mülls), H. Koschmieder. Brennstoff- und Wärmewirtschaft, vol. 6, nos. 10 and 11, Oct. and Nov. 1924, pp. 207-212 and 229-235, 5 figs. Discusses variety of refuse, composition and calorific value, and experiments in various German towns with refuse firing. Details of Dörr-Didier, Humboldt, and Herbertz systems of refuse firing.

REFUSE DISPOSAL

[See also GARBAGE DISPOSAL.]

American Practice. Résumé of American Practice in the Disposal of Refuse, S. A. Greeley. Surveyor & Mun. & County Engr., vol. 66, no. 1700, Aug. 15, 1924, pp. 149-150. See also Can. Engr., vol. 47, no. 10, Sept. 2, 1924, pp. 297-298. Describes methods more extensively used in America; reduction of garbage, hog feeding, incineration and comparison of methods. Abstract of paper read before Int. Conference on Sanitary Eng.

Birmingham, England. Refuse Utilisation Works: Birmingham. Ferro-Concrete, vol. 15, no. 12, June 1924, pp. 265-280, 3 figs. Description of Witton works recently opened for refuse disposal including two destructor units capable of burning to hard innocuous clinker 80 to 100 tons of house refuse per day; clinker crushing, grinding and sorting plant, magnetic separators, etc.

Destructors. Refuse Destructor with Unique Features. Contract Rec. & Eng. Rev., vol. 38, no. 26, June 25, 1924, pp. 641-644. Birmingham, England, has installed plant to handle 36,000 tons of refuse per year. Dust conveyed to barges by air pressure; special magnetic separator for cleaning clinker.

The First Step on the Production of Electric Power from the Destruction of City Refuse, K. Kishimoto. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 431, June 1924, pp. 575-614, 14 figs. Analysis of city refuse as fuel, and results obtained with its use in testing installation; data and results of evaporation test. (In Japanese.)

Factory. Factory Refuse. Eng. & Boiler House Rev., vol. 38, no. 4, Oct. 1924, pp. 150, and 153-154, 2 figs. Author advocates systematic collection of factory refuse and burning it in steam boiler equipped on scientific lines, or in special refuse destructor so as to utilize all heat for some useful purpose.

Incinerator, Waste-Heat from. See WASTE HEAT, Utilization.

Incinerators. Wilmington's New Incinerator, H. L. Maier. Pub. Wks., vol. 55, no. 2, Feb. 1924, pp. 56-58, 1 fig. Description of three-unit plant with capacity of 25 tons a day; result of a test run of five weeks, and of twelve months of service operation.

See also Destructors.

Milwaukee, Wis. Refuse Disposal in Milwaukee. Pub. Wks., vol. 55, no. 10, Oct. 1924, pp. 303-304. Abstract of paper read by T. C. Hatton before Am. Soc. for Mun. Improvements, dealing with operation and results obtained by Milwaukee garbage disposal plant, which has been in continuous operation for 13 years, and collection of garbage and other refuse.

New Orleans. The Refuse Problem in New Orleans, C. Schneider. La. Eng. Soc.—Proc., vol. 10, no. 1, Feb. 1924, pp. 13-29 and (discussion) 30-45, 6 figs. partly on supp. plate. Outlines program proposed for future solution of problem, and briefly summarizes previous investigations that have led to adoption of this program.

Paris, France. Rational Treatment of Municipal Refuse (Traitement rationnel des résidus urbains), A. Bigot. Chimie & Industrie, vol. 11, no. 5, May 1924, pp. 857-872, 12 figs. Deals with collection, composition, sorting, drying and sterilization; manufacture of sand-lime brick and other ceramic products from mineral portion of refuse; all with special reference to Paris.

Plants, Electricity Generation at. See ELECTRIC POWER, Production.

Salvage Plant. New Refuse Salvage Works at Birmingham (England). Engineer, vol. 137, no. 3564, Apr. 18, 1924, pp. 419-421, 1 fig. Description of salvage plant, destructor and clinker plant. See also Surveyor, vol. 65, no. 1683, Apr. 18, 1924, pp. 377-380, 6 figs.

Separation and Salvage. Refuse Disposal by Separation and Salvage, J. Gair. Surveyor & Mun. & County Engr., vol. 66, no. 1702, Aug. 29, 1924, pp. 185-186. See also Can. Engr., vol. 47, no. 17, Oct. 21, 1924, pp. 444-445. Discusses disposal methods of Sheffield, Westminster, Newark, Birmingham, and Marylebon; steam from refuse. Abstract of paper read before Int. Conference on Sanitary Eng.

REGULATORS

Arca. Arca Regulators at the British Empire Exhibition. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 714-716, 7 figs. Recent applications of system and improved forms of components lately introduced and shown by firm at Exhibition.

Oil-Pressure. The Working of a Generating Set Provided with an Oil-Pressure Regulator (Fonctionnement d'un groupe electrogène pourvu d'un regulateur à pression d'huile, sous la forme la plus générale), M. Barbillion. Revue de l'Industrie Minérale, no. 75, Feb. 1, 1924, pp. 69-76, 2 figs. Discusses working of a tachymetric oil-pressure regulator; design and calculation.

Polyphase Induction. Polyphase Induction Regulators, L. H. A. Carr. Elec. Rev., vol. 95, no. 2446, Oct. 10, 1924, pp. 528-530, 10 figs. Details of design and operation.

Pressure. An Automatic Pressure Regulator, L. E. Dawson. Indus. & Eng. Chem., vol. 16, no. 2, Feb. 1924, pp. 160-161, 1 fig. Apparatus satisfactorily maintains steady pressure for period of days with maximum variation of only 2 or 3 mm. of mercury when operating under 500 mm. vacuum.

Universal. A New Universal Regulator for the Control of Temperature, Pressure, Humidity, etc., T. Lindsay. Domestic Eng. (Lond.), vol. 44, nos.

3 and 4, Mar. and Apr. 1924, pp. 58-60 and 75-82, 20 figs. Description of a regulator which can be successfully applied to automatic control of practically any physical property; comprises a single-acting water pressure cylinder and a counterweight, water power being operating medium.

REHEATING. See CENTRAL STATIONS, Reheating in.

RELATIVITY

Electrodynamics. Principle of Relativity in Electrodynamics (Il principio di relatività nell'elettrodinamica), G. Corte. Rivista Marittima, vol. 57, no. 9, Sept. 1924, pp. 299-308. Discusses non-conformity of Maxwell's equations and classical mechanics, Lorentz transformations, validity of classical mechanics in case of small velocity of electrons, etc.

Origin and Nature of. The Origin, Nature and Influence of Relativity, G. D. Birkhoff. Sci. Monthly, vol. 18, no. 6, June 1924, pp. 616-624. Experimental tests of relativity.

RELAYS

Arc. Electro-Optic Application of Arc Relays (Sur quelques applications électro-optiques des relais à arc), L. Dunover and P. Toulon. Académe des Sciences—Comptes rendus des séances, vol. 179, no. 9, Sept. 1, 1924, pp. 461-464. Discusses use of relay for optic signaling, directed radiotelephony, recording and reproducing words, etc.

Bell Telephone System. Relays in the Bell System, S. P. Shackleton and H. W. Purcell. Bell System Tech. Jl., vol. 3, no. 1, Jan. 1924, pp. 1-42, 29 figs. Outlines relay developments leading up to and making possible present communication system, with particular reference to electromagnetic relays.

Control of Time Element. Controlling the Time Element of Relays (Beeinflussung der Schaltzeiten von Relais), E. Schulze. Zeit. für Fernmeldetechnik, vol. 5, nos. 4, 5, 6, 7, and 9, Apr. 16, May 16, June 16, July 16, and Sept. 16, 1924, pp. 28-32, 36-40, 41-48, 51-56, and 87-88, 46 figs. Discusses most important means to influence time or speed elements from theoretical and experimental standpoint; retarding action of relays by incandescent lamps, metal-filament lamps, short-circuit windings, etc.; concludes that parallel connection of thermically changeable resistances from metal-filament lamps to relay are best. See also article by same author entitled Control of Relays by Means of Condensers (Beeinflussung der Schaltzeiten von Relais durch Kondensatoren), in Elektrotechnik u. Maschinenbau, vol. 42, no. 35, Aug. 31, 1924, pp. 529-534, 5 figs.

Differentially-Connected, Testing of. Testing Differentially Connected Relays, C. M. King. Power, vol. 59, no. 14, Apr. 1, 1924, pp. 530-531, 3 figs. Instructions for making suitable tests before generator has been put into service and while generator is in operation, also how to make periodic tests.

Distance. Distance Relays for Selective Disconnection of Defective Sections (Zur Frage der Distanzrelais zum selektiven Abschalten beschädigter Netzteile), M. Schleicher. Elektrische Betrieb, vol. 22, no. 20, Oct. 24, 1924, pp. 205-211, 14 figs. Particulars of Westinghouse and A. E. G. distance relays. History and development of distance relays and their properties.

Electrostatic. Rectifying Action of So-called Electrostatic Relays and Explanation of Action of Contact Detectors (Die Gleichrichtwirkung des sogenannten elektrostatischen Relais und die Erklärung der Wirkungsweise der Kontaktdetektoren), W. Kramer. Zeit. für Physik, vol. 27, no. 1, 1924, pp. 74-82, 7 figs. Discusses theory of detector action, valve action of electrostatic relays, semi-conductors, arrangement of relays, etc.

Overload. Calibration of Induction-Type Overload Relays, R. A. Andrews. Elec. World, vol. 83, no. 25, June 21, 1924, pp. 1278-1280, 9 figs. Oscillographic study of electrical characteristics shows that iron saturation makes phantom testing unreliable.

Temperature Overload Relays, B. W. Jones. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 345-347, 5 figs. Describes two types, for protecting all kinds of electric motors, thermally lagged overload relay, and two-element temperature overload relays.

Protective. A Phase Balance Current Relay of the Negative Phase Sequence Type, J. V. Breisky. Elec. Jl., vol. 21, no. 2, Feb. 1924, pp. 77-81, 9 figs. Describes relay for protecting polyphase motors or rotary converters against running with phases unbalanced sufficiently to cause undue heating, with an open phase, or with a reversal of phases; operates successfully under all conditions of unbalance, and is sufficiently low in cost to make it suitable for extensive application; made possible by application of new theory dealing with solution of polyphase networks by means of symmetrical coördinates.

Application of Protective Relays, H. M. Rankin. Elec. Light & Power, vol. 2, no. 10, Oct. 1924, pp. 15-17 and 62, 5 figs. Review of modern practice.

Differentially Connected Relays for Protecting Electrical Machinery, C. M. King. Power, vol. 59, no. 6, Feb. 5, 1924, pp. 210-211, 3 figs. Explains how differentially connected relays operate when trouble occurs in equipment they are protecting, and conditions that cause relay action and oil switch to open.

Radio-Frequency. Sensitive Radio-Frequency Relay, Geo. Lewis. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1031-1033, 4 figs. Theoretical properties, mechanical construction, and possible application of new electron relay, invented and developed by S. Ruben, of New York; its use is suggested in radio and carried-current systems, and where similar requirements are to be met.

Types. Relays for the Protection of Distribution Systems, H. E. Frey. Brown Boveri Rev., vol. 11, nos. 11 and 12, Nov. and Dec., 1924, pp. 235-242 and 273-281, 41 figs. Describes types of relays made by Brown Boveri Co.; over-current inverse time-limit relay; series definite time-limit relay; over-current definite time-limit relay; reverse-power relay; methods of tripping. Selective protection.

"Z"-Connected. Overload Protection by "Z" Connected Relays or Trip Coils. Elec. Rev., vol. 94, no. 2426, May 23, 1924, pp. 828-829, 8 figs. Describes "Z" method of connecting up relays and current transformers, which may be used on either three-phase three-wire, or three-phase four-wire systems with equal reliability. Examples showing current flowing through "Z" connected relays under normal conditions and also under varying conditions of overload.

RESEARCH

Agricultural Engineering. See AGRICULTURE, Farm Equipment, Research in.

Cement and Concrete. See CONCRETE, Research.

Electrical Engineering. Industrial Research, with Special Reference to Electrical Engineering Development, W. Wilson. Instn. Elec. Engrs.—Jl., vol. 62, no. 325, Jan. 1924, pp. 61-82 and (discussion) 83-107, 17 figs. Classes of research

work; need for technical development; causes of present position; functions of development department; recording and filing of results; indexes of literature and information; industrial research organizations in Great Britain. Bibliography.

Electrical Industry. The Field of Research in Industrial Institutions, E. W. Rice, Jr. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 720-728. Consideration of field for research, especially in electrical industry.

The Influence of Research on the Electrical Industry, A. P. M. Fleming and J. G. Pearce. World Power (formerly Beama), vol. 1, no. 1, Jan. 1924, pp. 13-17. Illustrates progress through research; progress in materials; research and engineering developments; revolutionary and evolutionary research; research in industry; coöperative research.

Forest. See FORESTRY, Research.

Industrial. The Management of Industrial Research, J. M. Weiss and C. R. Downs. Chem. & Met. Eng., vol. 30, nos. 12, 13, and 14, Mar. 24, 31, and Apr. 7, 1924, pp. 475-478, 513-516, and 549-554. Mar. 24: Building of esprit de corps. Mar. 31: Kind of research organization necessary in special industry and relations with other departments of company. Apr. 7: Accounting system for development department and argument for its use.

Industrial, Utilization of Statistics in. The Utilization of Statistics, A New and Valuable Aid in Industrial Research and in the Evaluation of Test Data, K. H. Daeves. Testing, vol. 1, no. 3, Mar. 1924, pp. 173-189, 11 figs. Attempt is made to apply results of experience to industrial research; demonstration is given, by a number of examples, of how new "large figure research" may be applied to plant operation, to testing of materials, and control of services rendered, and how important conclusions may be drawn from the very simple application of method; relation is established in which this statistical research stands to pure science, its value to industrial research and operating engineer is demonstrated, and other fields of application are intimated.

Lighting. See LIGHTING, Research.

National Physical Laboratory. The Work of the National Physical Laboratory, F. Broadbent. World Power, vol. 2, no. 10, Oct. 1924, pp. 204-209. Review of annual report. Routine tests; research; radio apparatus; electrical instruments; cables; busbar rating; boundary lubrication; lubrication and superheat; mechanical properties of materials; 1,000,000-volt plant.

Patents and. See PATENTS, Research.

Statistical Methods, Application of. Some Applications of Statistical Methods to the Analysis of Physical and Engineering Data, W. A. Shewhart. Bell System Tech. Jl., vol. 3, no. 1, Jan. 1924, pp. 43-87, 13 figs. Deals with application of elementary statistical methods for finding best frequency distribution of deviations; points out limitations of theory of errors, based on normal law; points out advantages to be gained by physicist or engineer from an application of methods reviewed.

Steam. See STEAM, Research.

Technology Plan of Industrial Coöperation, M. I. T. Five Years of the Technology Plan. Technology Rev., vol. 27, no. 2, Dec. 1924, pp. 78-81. Essence of plan, now in existence 5 years, was coöperative arrangement whereby industrial concerns in search of aid in scientific research and investigation were to pay Mass. Inst. Technology stated sums of money as retainer fees in return for which research staff and facilities of Institute were to be placed with certain limitations at their disposal; how coöperative plan has fulfilled its promise; proposal for future.

RESERVOIRS

Calculation. Calculation of Water Reservoirs With Upper and Lower Storage Chamber (Zur Berechnung von Wasserschlössern mit oberer und unterer Speicherkammer), L. Mühlhofer. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, nos. 45-46 and 47-48, Nov. 14 and 28, 1924, pp. 393-399 and 407-411, 6 figs. Discusses fundamental equations for movement of levels, sudden and complete shutting off of pressure conduit, sudden increase in load or of water drawn, etc. Gives practical examples.

Circular. Design of Reinforced Concrete Circular Reservoirs. Ferro-Concrete, vol. 16, nos. 1 and 3, July and Sept. 1924, pp. 9-12 and 61-64, 1 fig. Discusses new and more precise method of calculation. Translated from Constructeur de Ciment Armé.

Construction. Modern Methods of Constructing Reservoirs, R. E. McDonnell. Fire & Water Eng., vol. 76, no. 19, Nov. 5, 1924, pp. 1015-1016 and 1049, 7 figs. See also Eng. & Contracting (Water Wks.), vol. 62, no. 5, Nov. 12, 1924, pp. 1061-1065, 8 figs. Suggestions as to best types; proper size of reserve reservoir; advantages of covered style; making them watertight.

Modern Methods in Reservoir Building. Pub. Works, vol. 55, no. 9, Sept. 1924, pp. 289-292, 7 figs. Belt conveyors used for moving earth, aggregate, cement and concrete, over any distance and elevation desired; removing thin topsoil at minimum cost at Wanaque dam.

Failures. Failure of a Concrete Reservoir of Curious Design, J. C. Pinney. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 282-283, 4 figs. Four sides fall out of square structure at plant of Cudahy Bros. in Wisconsin; beam and side walls of reservoir were tied at corners by exposed diagonal rods.

Hume, Australia. See HYDROELECTRIC DEVELOPMENTS, Australia.

Remodeling. Repairing and Remodelling a Damaged Reservoir. Engineer, vol. 138, no. 3592, Oct. 31, 1924, pp. 493-494, 9 figs., partly on p. 496. Particulars of reconditioning reservoir which had original capacity of 4,250,000 gal., and is constructed on gravel foundation, with floor and walls of mass concrete.

Silting, Overcoming. Methods of Overcoming Silting of Reservoirs Outlined. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, p. 306. Four methods of overcoming trouble from silt, as given in studies of water power of Deep River in North Carolina, made by North Carolina Geol. & Economic Survey. Development of streams reduces trouble from silt.

Stillwater, N. Y. How a River Control District Is Building Its Reservoir, E. S. Cullings. Eng. News-Rec., vol. 92, no. 18, May 1, 1924, pp. 763-764, 2 figs. Organization of first river-regulating district under New York conservation law; details of Stillwater reservoir.

RESIN

Albertol Synthetic. Albertol, and the Present Statue of the German Synthetic Resin Industry ("Die Albertole," zugleich ein Bild des heutigen Standes der deutschen Kunstharzindustrie), E. Fonrobert. Kunststoffe, vol. 13, nos. 11-12, Nov.-Dec. 1923, pp. 109-122. See also (translation in abstract) Chem. Age (N. Y.), vol. 32, nos. 4 and 5, Apr. and May 1924, pp. 167-168 and 221-223. Describes synthetic resins manufactured in Kurt Albert Chemical Works and known under trade name of Albertol; different kinds of Albertols and their various uses.

Fossil. Fossil Gums, W. M. Myers. Chem. & Met. Eng., vol. 31, nos. 16, 17, and 18, Oct. 20, 27, and Nov. 3, 1924, pp. 617-618, 663-664, and 702. Oct. 20: Commercial recovery; occurrence

and mining of amber. Oct. 27: Production and use of kauri in New Zealand. Nov. 3: Copal gum.

Latin America. Gums and Resins of Latin America, O. Wilson. Chem. & Met. Eng., vol. 31, no. 10, Sept. 8, 1924, pp. 374-376, 5 figs. Chicle, elemi, manjak and many other materials of considerable industrial importance are available but await commercial exploitation.

RESONATORS. See ACOUSTICS, Resonators.

RETAINING WALLS

Calculation. Retaining Walls for Water (Sui muri dritti di ritenuta d'acqua), L. Conti. Annali dei Lavori Pubblici, vol. 62, no. 8, Aug. 1924, pp. 746-775, 1 fig. Discusses straight walls of triangular profiles, elasticity and stability, and makes calculations to determine most economic profile for given conditions.

Earth Pressure. See EARTH, Pressure.

Reinforced-Concrete. Reinforced Concrete Retaining Wall for Containing Gliding Ground (Muro de hormigón armada para contención de terrenos corredizos), C. M. Lahuerta. Revista de Obras Públicas, vol. 72, no. 17, Sept. 1, 1924, pp. 323-327, 8 figs. Details of construction of wall of railroad shops at Granada, (Sierra Nevada), and steel reinforcing of buttresses.

Step. Step-Retaining Walls at Astoria, Oregon, U. S. A. Engineering, vol. 117, no. 138, Feb. 1, 1924, pp. 138-139, 11 figs. partly on p. 146. Describes Aston type of step wall, of which 10,000 lin. ft. have been constructed at Astoria; its advantages and savings effected.

RHEOSTATS

Calculation. Calculation of Feeder Rheostats (Note sur le calcul des rhéostats de feeder), A. Castex. Industrie Electrique, vol. 33, no. 761, Mar. 10, 1924, pp. 85-90, 7 figs. Calculation of resistance of rheostat and graphical interpretation.

Starting. Calculation of Number of Contact Studs of a Motor Rheostat (Calcul du nombre de plots des rhéostats d'excitation), A. Léemann. Revue Générale de l'Electricité, vol. 16, no. 13, Sept. 27, 1924, pp. 501-505, 7 figs. Develops formulas for calculation which are more convenient than graphic method generally used.

Maintenance of Direct-Current Starting Rheostats, E. C. Parham. Nat. Engr., vol. 28, nos. 7, 8, 9, and 12, July, Aug., Sept., and Dec. 1924, pp. 329-331, 371-374, 442-444, and 595-597, 21 figs. Practical pointers on care, adjustment, testing and repair of direct-current rheostats that have their holding coils in series with shunt field circuit of motor; how to locate troubles, make necessary tests, and properly care for rheostats of this type; instructions for properly connecting rheostat to line and motor; troubles produced by making wrong connections, and how to detect them; non-voltage release coil troubles; testing rheostats.

RIFLES

Bolt Manufacture. Manufacture of the Bolt of the Springfield Rifle, E. McFarland. Mech. Eng., vol. 46, no. 8, Aug. 1924, pp. 463-470 and (discussion) 470-471, 19 figs. Methods employed in manufacture of bolt of Springfield rifle form an example of highly specialized use of tools, jigs, fixtures, and gages which is typical of gun-making industry. Describes a number of machining operations which are particularly adopted to gun manufacture, but which at same time may find some application in other lines of production. Particulars of system of gaging used.

RINGS

Steel, Shrinking on. Shrinking-On of Steel Rings (Aufschrumpfung von Stahlringen), E. Rosenberg. Elektrotechnische Zeit., vol. 45, no. 30, July 24, 1924, pp. 803-804, 4 figs. See also Elektrotechnik u. Maschinenbau, vol. 42, no. 30, July 27, 1924, pp. 468-470, 4 figs. Steel rings forming rotor of large hydro-turbo-generators are heated electrically and then shrunk onto shaft; advantages of electric heating, etc.

RIVER VESSELS

Harbor Work, Use for. River Steamers Used In Coast Service, C. H. Handy. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 223-227, 4 figs. General details of two United States War Dept., 150-ft. river type steamers for harbor work, the General John McD. Hyde, for service on Long Island Sound, and the General Frank M. Coxe, sent to Pacific coast for station in San Francisco Harbor.

Model Experiments. Model Experiments on Rhine Ships, G. F. K. Wrobbel. Shipbldg. & Shipg. Rec., vol. 23, no. 14, Apr. 3, 1924, pp. 398-400, 5 figs. Comparison of normal with so-called "bridge construction" form. Abstracted translation of article published in Het Schip.

Propulsion. See SHIP PROPULSION, River Vessels.

Shallow-Draft Steamers. The Shallow Draught Steamer "Wanhsien." Engineering, vol. 137, no. 3027, Jan. 4, 1924, p. 10, 13 figs. on supp. plate. Steamer for service on Yangtze-Kiang, China, was designed to carry both passengers and cargo.

Superheaters for. See SUPERHEATERS, River Boats.

RIVERS

[See also INLAND WATERWAYS.]

Bank Protection. Chicago & Alton Defeats Missouri River by Narrow Margin. Ry. Eng. & Maintenance, vol. 20, no. 5, June 1924, pp. 231-232, 4 figs. Use of unusual methods holds banks of stream which threatened to cut railroad in two; measures employed included sinking of bodies of 110 steel gondola cars in stream, and placing of large masses of brush and rock between cars and banks.

Curbing a Threatened Diversion of the Missouri River. Eng. News-Rec., vol. 93, no. 10, Sept. 4, 1924, pp. 372-375, 5 figs. Destruction of railway and highway communications and disastrous results to river-front city all threatened in recent sudden erosion of south bank of Missouri River near Glasgow, Mo. Particulars of emergency protective work. Permanent protection work under way.

Brushwood Constructions. See HYDRAULICS, Engineering Problems.

Closing Break. Turning the Yellow River Back into Its Channel. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 224-227, 4 figs. Chinese River cuts 6000-ft. gap through main dike; new channel excavated and old channel closed by rock-fill dam; cost of excavation by Chinese labor.

Colorado. Engineering Opinions on Colorado Problem. Ariz. Min. Jl., vol. 8, no. 11, Nov. 1, 1924, pp. 33-39. Testimony of engineers before Committee on Irrigation and Reclamation of House of Representatives relative to projected plans for development of lower Colorado River Basin.

The Colorado River Problem, W. Kelly. Am. Soc. Civil Engrs.—Proc., vol. 50, no. 6, Aug. 1924, pp. 795-836, 11 figs. Offers impartial digest of published facts and estimate of probabilities, including unpublished studies on flood protection, water supply, irrigable areas, etc.; gives salient features of comprehensive scheme of development. See (discussion) in vol. 50, no. 9, Nov. 1924, pp. 1436-1499 and vol. 51, no. 2, Feb. 1925, pp. 262-288, 11 figs.

Control. The Economic Control of Rivers (L'Aménagement des Rivières), H. Lang. Annales des Ponts & Chaussées, vol. 94, no. 2, Mar.-Apr.

1924, pp. 197-208, 6 figs. Notes on conditioning rivers for navigation and method of determining characteristics of natural waterway.

Discharge, Measurements of. Recent Developments in Methods of Computation of River Discharge, C. H. Pierce. Cornell Civ. Engr., vol. 33, no. 1, Oct. 1924, pp. 9-12, 2 figs. New methods developed by U. S. Geol. Survey which are more accurate than old methods; describes discharge integrator, precision instrument so constructed as to make continuous application of rating curve to gage height graph throughout 24-hr. period or whatever period may be selected as unit of time, and which sums up in such a way as to show average rate of flow in cubic feet per second.

The Measurement of the Discharge of the Nile through the Sluices of the Assuan Dam, H. E. Hurst and D. A. F. Watt. Engineering, vol. 117, no. 3035, Feb. 29, 1924, p. 281. Describes first measurements of higher stages of Nile made by method depending ultimately on direct measurements of volume in masonry tank. . (Abstract.) Paper read before Instn. Civ. Engrs. See also abstract of paper by same authors on same page entitled, Similarity of Motion of Water through Slices and through Scale Models.

Diversion of Water from Great Lakes. Chicago's Diversion of Water from the Great Lakes. Eng. News-Rec., vol. 92, no. 1, Jan. 3, 1924, pp. 28-31. History of one of noted cases of water diversion with state, national, and international complications which is once more subject of possible litigation, federal legislation, and international agreement.

Experimental. An Experimental River. Engineer, vol. 137, no. 3565, Apr. 25, 1924, pp. 452-454, 3 figs. Devised and constructed at its Waterside works at Ipswich by Ransomes & Rapier, specialists in sluice work; model is constructed of concrete and consists of two arms of unequal length, one arranged at right angles to other; arrangements for measuring flow of water and ascertaining depth at various points.

Flood Control. See FLOOD CONTROL.

Floods. See FLOODS.

Flow in. See FLOW OF WATER, Rivers; STREAM FLOW.

Grand, Power Development. Grand River Conservation and Power Development, W. H. Breithaup. Eng. Jl., vol. 7, no. 9, Sept. 1924, pp. 604-606, 1 fig. Possibility of power development and its beneficial effect in preventing destructive floods.

Levees. Levees on Mississippi Tend to Lower River Bed, Chas. L. Potter. Eng. News-Rec., vol. 92, no. 7, Feb. 14, 1924, pp. 280-282, 1 fig. Low-water gage readings in Lower St. Francis and Reelfoot basins over long period of years submitted in proof of this contention.

Mississippi. The River and Harbor Problems of the Lower Mississippi—A Symposium. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 311-328, 4 figs. Discussion.

Mississippi, Transportation on. Upper Mississippi River Transportation, J. Brodie. Soc. Automotive Engrs.—Jl., vol. 14, no. 5, May 1924, pp. 516-521, 1 fig. Decline of water transportation; what river freight transportation requires; demand for water transportation of freight; type of boat required; use of internal-combustion engine; freight handling and protection.

Movement of Beds. Behavior of Movable Bed in Rivers Carrying Drift With Rising and Falling Level (Das Verhalten der beweglichen Sohle in geschiebeführenden Flüssen bei steigendem und fallendem Wasser), E. Faber. **Bautechnik, vol. 2,** no. 39, Sept. 12, 1924, pp. 426-430. Discusses variation of profile of surface of river beds with high and low water and cites various examples.

Pollution. See STREAM POLLUTION.

Rhine. Improvements of the Rhine Between Basel and Lake Constance (Der Ausbau des Rheins zwischen Basel und Bodensee), E. Mattern. Zeit. dess Vereines deutscher Ingenieure, vol. 68, nos. 29 and 30, July 19 and 26, 1924, pp. 752-756 and 774-776, 10 figs. Discusses various proposals to improve navigation; cost of production of water transportation and freights anticipated; harmonizing power developments with these improvements.

Rio Grande, Mexico. Hydrometric Service of the Rio Grande or Bravo (El servicio hidrométrico en el Rio Grande o Bravo del Norte), A. Santacruz, Jr. Revista Mexicana de Ingeniería y Arquitectura, vol. 2, no. 7, July 15, 1924, pp. 391-420, 7 figs. Details of hydrometric stations, observations and calculation of flow, sedimentation, etc.

St. Lawrence. The St. Lawrence River Problem, D. W. McLachlan. Eng. Jl., vol. 7, no. 3, Mar. 1924, pp. 119-141 and (discussion) 142-146, 25 figs. Important features of various projects for improvement of St. Lawrence River for power and navigation; international status; ice conditions; statement showing net heads obtainable in winter by various schemes considered; double development projects; possible modification of official plan; modification of plans for geographical system of dividing costs; economy of waterway project; practicability of waterway; calculations of future channel slopes in open season.

Sand Movement Along Channel. Some Model Investigations About the Motion of Sand Along a Self-Formed Channel, H. Nakayama. Tokyo Imperial University—Jl. of Faculty of Eng., vol. 13, no. 6, Mar. 1924, pp. 193-253, 46 figs., mainly on supp. plates. Model experiments carried out by author to ascertain change of forms of cross section, variation of slope of water surface, volume of sand carried along water course, relation between surface slope of water course at given point and volume of sand carried through that station.

Trent, England. Trent Navigation Improvement. Engineer, vol. 138, no. 3594, Nov. 14, 1924, p. 563, 10 figs., partly on supp. plate. Describes scheme of new locks and weirs now being carried out.

Yellow, China. The Improvement of the Yellow River, H. van der Veen. Assn. Chinese & Am. Engrs.—Jl., vol. 5, nos. 8 and 9, Aug. and Sept. 1924, pp. 1-8 and 9-21, 7 figs. on supp. plates. Characteristics of river, and present method of control. Explains principles underlying a radical improvement and proves their correctness, and proper methods to bring about desired result; advantages to be gained by improvement.

See also Closing Break.

RIVETED JOINTS

Frictional Resistance of. Determination of the Frictional Resistance of Rivet and Bolt Connections (Bestämning av glidmotståndet i nit- och bultförband), W. Weibull. Teknisk Tidskrift, vol. 54, nos. 3 and 7, Jan. 19 and Feb. 16, 1924, pp. 17-21 and 51-54 (Allmänna Avdelningen), 11 figs. Results of measurement of friction between steel plates; calculation of stresses in rivets. Diagrams and tables.

Rivet Arrangement, Effect of. The Influence of Rivet Arrangement upon Eccentricity in Asymmetrical Sections, G. D. Balsille. Commonwealth Engr., vol. 12, no. 2, Sept. 1, 1924, pp. 55-56, 1 fig. Investigation to determine effect of varying rivet arrangement, while still adhering to standard hole spacing, upon values of eccentricity factor.

Slip in Single and Repetitive Loading. Slip of Riveted Joints in Single and Repetitive Loading, D. H. Blakelock. Eng. News-Rec., vol. 92, no.

23, June 5, 1924, pp. 972-973, 3 figs. Results of 70 tests carried out at Cornell University on butt joints indicate first slip at average rivet shear of 5900 lb. per sq. in.

Stresses in. Stresses in the Riveted Joints of Steel Structures (Die Beanspruchung der Nietverbindungen bei Eisenkonstruktionen), Müllenhoff. Zentralblatt der Bauverwaltung, vol. 43, no. 101-102, Dec. 19, 1923, pp. 13 figs. Theoretical investigations and scientific measurements of stresses occurring. Great influence of quality of workmanship is emphasized.

RIVETING

Boiler. See BOILERMAKING, Riveting.

Machines for. Application of Work-Regulating Drive in Hydraulic Machines (Die Anwendung des Arbeitsreglerantriebes bei hydraulischen Maschinen), P. Hohnen. Maschinenbau, vol. 3, no. 23, Sept. 11, 1924, pp. 850-852, 3 figs. Describes A. E. G. automatically regulated electric motor and compares a riveting plant driven by such a motor with one having hydraulic drive.

Giant Portable Compressed Air Riveting Machine, J. C. Hanna. Compressed Air Mag., vol. 29, no. 5, May 1924, pp. 861-863, 4 figs. Description of 150-ton riveter designed and manufactured by Hanna Eng. Wks., Chicago, Ill.; makes use of compressed air in forming rivet heads, and compressed air is also drawn upon in rotating machine as well as in tilting it. Character of work that it performs.

Hydraulically Compressed Boiler Riveting (Hydraulisch gepresste Kesselnietung). Schiffbau, vol. 25, no. 12, Mar. 26, 1924, pp. 310-312, 6 figs. Describes stationary and portable types of hydraulic riveting machines and their operation.

Plate Tightening Before. See PNEUMATIC MACHINERY, Plate-Tightening Machine.

RIVETS

Cutting With Electric Arc. Rivet Cutting with an Electric Arc. Ry. Rev., vol. 74, no. 7, Feb. 16, 1924, pp. 290-292, 6 figs. Describes equipment in use for burning off of rivets on steel cars and locomotive boilers and tender tanks at Huntington, W. Va., shops of Chesapeake & Ohio Ry.

Heat Treating Steel for. Heat Treating Low-Carbon Bars for Rivets, C. B. Langstroth. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 849-850, 3 figs. Advantage derived from heat treating low-carbon steel as shown by some experience with rivets; cold working strains, as cause of broken heads, removed; properties of final product improved.

Red-Hot, Pneumatic Handling of. Pneumatic Handling of Red Hot Rivets, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 11, no. 1, Jan. 10, 1924, pp. 19-21, 3 figs. Furman method; describes Penflex rivet gun, its air consumption and working costs; conveying distance and speed.

Steel for, Endurance Tests on. See STEEL, Rivet.

ROAD CONSTRUCTION

[See also HIGHWAYS.]

Aggregates. Road and Pavement Aggregates, J. H. Bateman. Rock Products, vol. 27, no. 7, Apr. 5, 1924, pp. 32-33. Considerations affecting size and other properties of crushed stone, sand, and gravel used in construction of gravel roads, concrete pavements, and macadam roads. Abstract from Proc. of Ninth Annual Conference of Highway Eng.

City Paving Departments. See INDUSTRIAL ORGANIZATION, City Paving Departments.

Cliff Road. Building a Cliff Road to the Bear Mountain Bridge, J. M. Belknap. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 736-738, 4 figs. Shelf blasted out of Anthony's Nose and Manitou Cliffs and paved with concrete gives access to east bridgehead and by bridge to west side of Hudson River.

Cost Estimating. Notes on Estimating in Road Construction Work. Surveyor & Mun. & County Engr., vol. 65, no. 1687, May 16, 1924, pp. 465-467. Outlines a few examples illustrating how estimating prices are ascertained, and numerous items which have to be considered in deducing such prices.

England. Reviewing Modern Construction of Roads in England, F. G. Bailey. Highway Engr. & Contractor, vol. 10, no. 1, Jan. 1924, pp. 55-59, 9 figs. Present-day methods for construction of main and subsidiary roads.

Federal-Aid Highway System. Federal and State Policies in the Construction of the Federal Aid Highway System, T. H. MacDonald. Eng. & Contracting (Roads & Streets), vol. 61, no. 1, Jan. 2, 1924, pp. 26-33. Paper presented at convention of Am. Assn. State Highway Officials, Dec. 4, 1923.

Florida. Building a Motor Road Across the Florida Everglades, F. E. Lawrence and R. Y. Patterson. Eng. News-Rec., vol. 93, no. 11, Sept. 11, 1924, pp. 412-417, 7 figs. Construction details of private toll road being built through Everglades and along shores of Lake Okeechobee to afford a cross-state connection for lower Florida; it is 51 miles long, and has been entirely financed and built by W. J. Conners, of Buffalo, N. Y., at a cost of nearly $2,000,000; marl fill on marsh soil surfaced with crushed stone and oiled.

Grading. Preliminary Computation of Earthwork Quantities, F. M. Garnett. Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 715-717, 4 figs. Rapid computation of earthwork quantities in highway grading by use of special tables.

The Cost of Grading With Fresnoes, J. L. Harrison. Pub. Roads, vol. 5, no. 8, Oct. 1924, pp. 10-15 and 23, 4 figs. Some suggestions as to common losses and how to avoid them.

The Effect of Haul on the Cost of Earthwork, J. L. Harrison. Pub. Roads, vol. 5, no. 7, Sept. 1924, pp. 14-17, 4 figs. Study conducted by Bur. Pub. Roads, and results.

Illinois. Building 1,000 Miles of Paved Road in One Season, C. M. Hathaway. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 63-65, 2 figs. Describes how Illinois built 741 mi. of hard-surfaced roads in 1922, and 1024 mi. in 1923.

Labor-Saving Machinery. Labor Saving Machinery for Street Construction Work. Gas Age.-Rec., vol. 54, no. 12, Sept. 20, 1924, pp. 391-393, Gives brief description of types of machines, their record of performance, and of savings which have been made. Abstract of paper read before Michigan Gas Assn. Convention.

Machinery for. See ROAD MACHINERY.

Methods and Costs. Business and Engineering of Road Construction. Eng. News-Rec., vol. 92, no. 3, Jan. 17, 1924, pp. 112-116, 2 figs. Contains abstracts of following papers read before Am. Road Bldrs. Assn.: Traffic Surveys, Methods and Costs, Geo. E. Hamlin; Simplified Practice—A Service to Road Builders, R. M. Hudson; Sand-Asphalt Road Construction Methods and Cost, E. R. Olbrich; Highway Traffic Accidents—Classification and Causes, N. M. Isabella.

Modern Methods of Road Maintenance and Construction, T. Somers. Surveyor & Mun. & County Engr., vol. 65, no. 1691, June 13, 1924, pp. 551-553. Subsoil and surface drainage; foundations; materials; rubber paving; tar and bituminous macadam; asphalt macadam; construction of new roads; etc.

Refined Tar in. Refined Tar in Highway Construction, J. S. Crandell. Can. Engr., vol. 47, no. 3, July 15, 1924, pp. 161-163, 3 figs. See also Eng. & Contracting (Roads & Streets), vol. 62, no. 2, Aug. 6, 1924, pp. 315-320, 6 figs. Subgrade must be carefully drained and prepared; laying wearing course; method of applying tarvia and finishing surface.

Spiral Curves, Use of. Spiral Curves Cut Costs of North Carolina Road Work, C. M. Pritchett. Eng. News-Rec., vol. 93, no. 4, July 24, 1924, pp. 132-135, 3 figs. Searle's railway spiral adapted to road work reduces surfacing and grading costs, simplifies field surveys, and cuts down office computations. Spiraling of highway curves has been adopted as standard practice by North Carolina State Highway Commission.

Subgrade-Soil Tests. Practical Field Tests for Subgrade Soils, A. C. Rose. Public Roads, vol. 5, no. 6, Aug. 1924, pp. 10-15, 12 figs. Suggested methods for measuring character of highway subgrades.

Surfacing. Economical Road Surfacing in a Sparsely Populated Semi-Arid Territory, J. L. Thayer. Eng. & Contracting (Roads & Streets), vol. 61, nos. 2 and 3, Feb. 6 and Mar. 5, 1924, pp. 317-326 and 503-509. Design, construction and maintenance of 14 typical examples. Portions of a thesis for degree fo C. E. submitted to State College of Wash., May 1, 1923.

Swamp. Construction of Highways Through Swamp Lands, J. M. Fourmy. Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 722-725, 3 figs. Methods employed in Louisiana.

Swamp Road Building Among the Indiana Sand Dunes, H. M. Herald. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 58-60, 4 figs. Dragline half floating on soft marsh land builds parallel muck dikes and fills between them with sand.

Tractors, Use in. See TRACTORS, Caterpillar.

Tropics. Road Construction in the Tropics, J. P. Swettenham. Surveyor & Mun. & County Engr., vol. 65, no. 1668, Jan. 4, 1924, pp. 9-12. Discusses organization, pegging out, clearing, gradients, drainage, provision for storm water, road bridges, slopes, camber, road metal supplies, and transport of materials. Extracts from paper read before Eng. Assn. of Malaya.

ROAD MACHINERY

Rollers. Barford and Perkins' Road Rollers. Surveyor & Mun. & County Engr., vol. 65, no. 1677, Mar. 7, 1924, pp. 271-272, 4 figs. Describes a quick-reverse motor roller for use in laying of asphaltic and bituminous carpeting of road surfaces. Brief description of works of Barford & Perkins, Peterborough, Eng.

See also STEAM ROLLERS.

Tamping and Concrete-Breaking. Tamping and Concrete Breaking Machine. Engineer, vol. 137, no. 3557, Feb. 29, 1924, p. 236, 2 figs. Small machine intended for trenches up to 2 ft. wide; capable of breaking up 30 ft. run of concrete 2 ft. wide and 9 in. thick per hr.; can be mechanically propelled, and can be easily moved forward and operated by one man.

ROAD MATERIALS

Hydraulic Binders. Hydraulic Binders for Highways (Les liants hydrocarbonés pour le revêtement des routes), F. Mange. Génie Civil, vol. 85, no. 20, Nov. 15, 1924, pp. 446-451. Use of tars and bitumen, and their comparative advantages; mixing with sand; composition of aggregates, and proportioning of binder.

Rock Asphalt. Cold-Mix Rock Asphalt Production and Roadbuilding. Eng. News-Rec., vol. 92, no. 21, May 22, 1924, pp. 886-890, 8 figs. Kentucky rock asphalt distinguished by its silica aggregate and ability to bound without heating; gives best service under constant traffic.

ROAD ROLLERS. See ROAD MACHINERY, Rollers.

ROADS

[See also HIGHWAYS.]

Asphalt. See ROADS, ASPHALT.

Automobile Development and. See AUTOMOBILES, Roads, Influence on Development.

Bates Experimental. Results and Application of the Bates Road Tests, C. Older. West. Soc. Engrs.—Jl., vol. 29, no. 5, May 1924, pp. 225-240, 7 figs. Conclusions derived from experiments conducted by State Highway Department at Bates Test Road, extending over past 3 years.

See also HIGHWAYS, Research.

Bituminous. See ROADS, BITUMINOUS.

Bituminous Surface. Limitations of Bituminous Surface Treatments and Bituminous Macadam Pavements Under Modern Traffic, W. Patterson. Mun. & County Engr., vol. 66, no. 4, Apr. 1924, pp. 159-165. Lack of standardization. Discusses service rendered by both types of surfaces under modern traffic, and points out certain unfortunate circumstances surrounding construction and maintenance of these surfaces which may account for the extremely variable results which are so apparent.

What is the Correct Method of Maintaining Bituminous Surfaces? E. A. James. Contract Rec. & Eng. Rev., vol. 38, no. 10, Mar. 5, 1924, pp. 246-248. See also Can. Engr., vol. 46, no. 10, Mar. 4, 1924, pp. 299-300 and 303, 1 fig. Discusses surface treatment of macadam roads, surface maintenance of penetration roads, and surface maintenance of hot-top pavements.

Brick. See ROADS, BRICK.

Causeways. See CAUSEWAYS.

Concrete. See ROADS, CONCRETE.

Construction. See ROAD CONSTRUCTION.

Culverts. See CULVERTS.

Drainage. See DRAINAGE, Roadbed.

Earth. See ROADS, EARTH.

Flexible-Base. Flexible Base Pavements in the Northwest, K. C. Schmidt. Mun. & County Eng., vol. 67, no. 5, Nov. 1924, pp. 224-229. Advantages of flexible-base pavements, i.e., pavements whose bases are of either some form of crushed rock such as Telford and waterbound macadam, or asphaltic concrete; Minnesota's first black base; mineral grading specifications; etc.

Utility of Flexible Base Pavements, E. C. Schmidt. Can. Engr., vol. 47, no. 26, Dec. 23, 1924, pp. 625-627. Discusses their adaptability, particularly in Northwest. Advantages of asphaltic concrete. Improved grading specification for coarse asphaltic concrete mixtures.

Grade Changes, Calculation of. Easy Method of Calculating Highway Grade Changes, W. E. Jones. Eng. & Contracting (Roads & Streets), vol. 62, no. 4, Oct. 1, 1924, pp. 723-724, 5 figs. Easily applied plan used by road design department of Iowa State Highway Commission.

Gravel. See ROADS, GRAVEL.

Impact Tests. Status of the Motor Truck Impact Tests of the Bureau of Public Roads, C. A. Hogentogler. Pub. Roads, vol. 5, no. 9, Nov. 1924, pp. 11-14, 6 figs. Details of tests on slabs; particulars of investigation in which force of impact delivered by an actual truck to an actual road is measured simultaneously with effect of blow on road surface.

See also ACCELEROMETERS, Impact Tests on Roads.

Macadam. See ROADS, MACADAM.

Maintenance. Comparative Cost of Maintaining Dirt, Gravel and Concrete Roads, W. F. Rosenwald. Minnesota Federation Architectural & Eng. Soc. —Bul., vol. 9, no. 7, July 1924, pp. 11-15, 2 figs. Discusses varying conditions of traffic, factors affecting maintenance costs and traffic capacity, and gives some cost figures for dirt, gravel, and concrete roads.

The Maintenance of Roads in a Large City, J. R. Findlay. Surveyor & Mun. & County Engr., vol. 65, no. 1670, Jan. 18, 1924, pp. 49-51. Deals especially with road widenings and road surfaces. From paper read at Scottish Road Conference, Edinburgh.

Maintenance Cost Keeping. Establishing a Cost-Keeping System, J. L. Boulanger. Can. Engr., vol. 47, no. 1, July 1, 1924, pp. 113-115. Legislation and organization leading to establishment of accurate system of cost-keeping for road maintenance in Quebec province.

Materials for. See ROAD MATERIALS.

Pavements. See PAVEMENTS.

Redressed-Granite-Block. Redressed Granite Block Paving in Philadelphia, J. Adler. Eng. News-Rec., vol. 93, no. 15, Oct. 9, 1924, pp. 582-585, 4 figs. This class of pavement has given complete satisfaction. Uniformity of depth of block more important, with regard to wear, than side dressing and joints. Bituminous joint filler gives satisfaction.

Resurfacing. Pavement Resurfacing and Reconstruction, H. J. Baum. Eng. & Contracting (Buildings), vol. 62, no. 6, Dec. 3, 1924, pp. 1209-1212. Outlines problems of smaller cities.

Resurfacing and Surfacing Treatments and When They Are Justified, Wm. A. VanDuzer. Cornell Civ. Engr., vol. 32, no. 6, Mar. 1924, pp. 78-79 and VI-VIII. Factors in determining resurfacing; preliminary maintenance steps; resurfacing macadam road; application of bituminous material; unbound macadam.

Sand-Clay and Semi-Gravel. Sand-Clay and Semi-Gravel Roads Studied. Pub. Roads, vol. 5, no. 8, Oct. 1924, pp. 16-19. Progress report of coöperative research on selected roads in Georgia.

Smoothness Control by Vialog. New York Adopts Vialog Test for Smoothness Control. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 74-76, 3 figs. Instrument attached to automobile inscribes graphs of and adds up irregularities in road surface traveled over. Includes following articles: Smoothness Requirements in New York, F. S. Greene; Vialog Operation and Graphs, H. Dunbar; Discussion of Smoothness Surveys, furnished by Bur. of Roads, N. Y.

Subgrade, Capillary-Moisture Removal. Removal of Capillary Moisture in Highway Subgrades, Chas. M. Upham and H. F. Janda. Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924, pp. 912-913, 3 figs. Tests show drain tile ineffective; coarse layers check rise of moisture in fine soils; sand most effective agent.

Surfaces, Tractive Resistance of. Tractive Resistance and Related Characteristics of Roadway Surfaces, T. R. Agg. Iowa State College of Agriculture & Mechanic Arts, vol. 22, no. 36, Feb. 6, 1924, 62 pp., 33 figs. Discusses tractive resistance of self-propelled vehicles, especially interaction of tire and road surface; measuring of rolling resistance and its variations, relation between type of tire and rolling resistance, fuel consumption, etc.

Traffic Surveys. Methods and Costs of Traffic Surveys, G. E. Hamlin. Eng. & Contracting (Roads & Streets), vol. 61, no. 3, Mar. 5, 1924, pp. 535-540, 5 figs. See also Mun. & County Eng., vol. 66, no. 2, Feb. 1924, pp. 65-69. How traffic census were taken on Connecticut highway system.

ROADS, ASPHALT

Black-Base-Foundation. "Black Base" Construction in Mercer County, New Jersey, H. F. Harris. Eng. & Contracting (Roads & Streets), vol. 62, no. 1, July 2, 1924, pp. 39-42, 4 figs. Methods and cost of constructing bituminous base for sheet asphalt on heavy traffic highway.

Sand-Asphalt. Design and Construction of Sand Asphalt Pavements, S. R. Murray. Mun. & County Eng., vol. 66, no. 6, June 1924, pp. 253-256, 9 figs. In authors' opinion and based on his experience, this is least expensive type of durable road which can be built in sand community and should give good service for at least 12 to 15 years.

Sheet Asphalt on Concrete. City of Detroit Builds Heavy Traffic Pavements. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 987-988, 2 figs. New streets have 11½-in. sheet-asphalt-on-concrete pavements; specifications tightened up following expert study of materials and construction practice.

Shoving. Shoving of Asphalt Pavements Is Over-Criticised, P. Hubbard. Eng. News-Rec., vol. 93, no. 22, Nov. 27, 1924, pp. 862-864, 3 figs. Points out that shoving in true asphalt is only occasional; stability test for asphalt mixtures.

ROADS, BITUMINOUS

Construction. Bituminous Surface Treatment and Bituminous Macadam, I. W. Patterson. Eng. & Contracting (Roads & Streets), vol. 61, no. 5, May 7, 1924, pp. 1008-1013. Service rendered by these types of surfaces under modern traffic.

Maintenance. Methods of Maintaining Bituminous Roads, E. A. James. Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 751-755, 2 figs. Experiences of Toronto and York Counties, Ontario, Roads Commission.

Service Rendered by. Bituminous Treatment Limitations, I. W. Patterson. Can. Engr., vol. 46, no. 25, June 17, 1924, pp. 621-625, 4 figs. Discussion of service rendered by surface treatments and bituminous macadam pavements under modern traffic; accounting for variable results.

Tar-Macadam Plant. Tar Macadam Plant with Scroll Drier and Cube Mixer. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 700-702, 12 figs. Details of plant installed at Port Clarence Works of Wake & Co., where work is being carried out on large slag heap from which their aggregate is procured.

ROADS, BRICK

Florida. The Brick Roads of Florida, C. A. Hogentogler. Pub. Roads, vol. 5, no. 2, Apr. 1924, pp. 18-28, 29 figs. Observations of behavior of brick surfaces laid on confined sand subgrades.

ROADS, CONCRETE

[See also PAVEMENTS, CONCRETE.]

Aggregates, Weighing of. Weighing Aggregates for Concrete Highway Pavement, R. W. Crum. Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 730-735, 6 figs. See also Highway Engr. & Contractor, vol. 2, no. 1, July 1924, pp. 57-59, 6 figs. Iowa Highway Commission has adopted actual weighing of aggregates on road pavement construction as standard practice. Discusses moisture content of aggregates and sand.

Construction. Concrete Roads in British Columbia. Contract Rec. & Eng. Rev., vol. 38, no. 4, Jan. 23, 1924, pp. 69-71, 7 figs. Construction methods used on Pacific Highway which links up Vancouver with international boundary.

Nashville-Springhope Highway, F. W. Skinner. Public Wks., vol. 55, no. 1, Jan. 1924, pp. 1-5, 4 figs. Fifteen miles of 16-ft. concrete surface laid on existing clay-gravel road in eight months; describes construction methods; hand work reduced to a minimum and close analysis of weekly reports to secure maximum efficiency.

Cracking. Checking of Concrete Road Surfaces, G. A. Macdonald. Can. Engr., vol. 47, no. 7, Aug. 12, 1924, pp. 235-239, 10 figs. Investigations into cause of cracking of concrete roads; details of experiments and conclusions drawn from results; suggested procedure to prevent cracking; concrete should be kept moist and covered with tarpaulins.

Crushing and Heaving of Bases. A Study of Crushing and Heaving of Concrete Pavement Bases, R. M. Green. Mun. & County Eng., vol. 66, no. 5, May 1924, pp. 216-219. Change in practice; effect of rise in temperature; effect of change in moisture content; results of tests and conclusions.

Curing. Cutting Down Curing Period for Concrete Roads, H. F. Clemmer. Eng. & Contracting (Roads & Streets), vol. 61, no. 2, Feb. 6, 1924, pp. 283-290, 5 figs. See also Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 577-580, 10 figs. and Can. Engr., vol. 46, no. 17, Apr. 22, 1924, pp. 455-457, 3 figs. Results of investigation conducted by Bur. of Materials of Ill. Division of Highways on use of calcium chloride. Thousands of tests of concrete cured with calcium chloride indicate that it cuts normal curing time in two and does not injure strength or soundness.

See also CONCRETE, Curing.

Dam Top. Design of Paved Road for Dam Top Dayton Flood Works, C. S. Bennett. Eng. News-Rec., vol. 93, no. 17, Oct. 23, 1924, pp. 660-661, 1 fig. Concrete road with gutter to control run-off crowns hydraulic fill at Huffman dam; cured with calcium chloride.

Design. New Design Expected to Cut Cost of Concrete Roads. Eng. News-Rec., vol. 92, no. 15, Apr. 10, 1924, pp. 614-615, 1 fig. Edges thickened, edge and joint bars anchored, longitudinal joint doweled, traffic line inlaid, and yardage reduced in new design planned by Pa. Highway Dept.

Progress in Concrete Road Construction and Design in 1923. Concrete, vol. 24, no. 1, Jan. 1924, pp. 3-11, 24 figs. Discussions by different men covering outstanding developments of 1923, Missouri's design changes, new specifications in California, expension joint changes in Nevada, practice in Delaware, road reinforcing, practice in Michigan, subgrade support, practice in Utah, etc.

Reinforcing and the Subgrade as Factors in the Design of Concrete Pavements, J. T. Pauls. Pub. Roads, vol. 5, no. 8, Oct. 1924, pp. 1-9, 4 figs. A study of experimental sections of Columbia Pike, an experimental road constructed by U. S. Bur. Pub. Roads near Arlington, Va.

Tentative Conclusions on Design of Concrete, C. Older. Eng. & Contracting (Roads & Streets), vol. 61, no. 5, May 7, 1924, pp. 981-993, 8 figs. Developments of past year in Illinois highway research and their probable bearing on rural pavement design.

See also HIGHWAYS, Concrete.

Friction Test. Friction Test of Concrete on Various Subbases, A. T. Goldbeck. Good Roads, vol. 67, no. 3, Sept. 1924, pp. 79-81. Description of specimens and method of tests; shows that frictional resistance is lowered by wet subbase; lowering frictional resistance should reduce frequency of transverse cracks.

Impact Tests. Impact Tests on Concrete Pavement Slabs, L. W. Teller. Pub. Roads, vol. 5, no. 2, Apr. 1924, pp. 1-14, 22 figs. Details of tests made by U. S. Bur. Pub. Roads to determine resistance of various designs to impact of motor vehicles, and results obtained.

Inspection of. Some Essential Points on the Inspection of Concrete Highways, H. S. Mattimore. Good Roads, vol. 67, no. 1, July 1924, pp. 1-2 and 14, 4 figs. In order to give unbiased opinion in judging service value of any type of road surfacing, complete investigation or analysis of design and methods of construction are necessary. Discusses sub-grade condition and reinforcing concrete road slabs.

Jamaica Bay Boulevard. Plant for Jamaica Bay Boulevard Construction, F. W. Skinner. Concrete, vol. 25, no. 2, Aug. 1924, pp. 50-54, 5 figs. Particulars of construction methods and equipment employed in connection with highway now under construction by Borough of Queens, New York City.

Non-Uniformity of Concrete. Causes of Non-uniformity of Concrete. Pub. Roads, vol. 5, no. 8, Oct. 1924, pp. 20-21. Replies received from State highway departments and district offices to tabulation forwarded by Bur. Pub. Roads showing results of compression tests on cores drilled from several concrete pavements in each of four widely separated states, which indicated a lack of uniformity in strength of concrete, with suggestions as to ways and means of improving uniformity.

Paducah, Ky. Street Pavement Design Based on Bates Road Tests, J. C. Keeley. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 298-300, 4 figs. Design and construction of 65,000-sq. yd. 7-in. concrete pavement at Paducah, Ky., begun in 1923.

Pontam Construction. Pontam Reinforced Concrete Pavements in France. Highway Engr. & Contractor, vol. 2, no. 1, July 1924, pp. 45-46, 2 figs. Pontam is made of reinforced concrete and has been laid chiefly in pre-cast sections heretofore, but may also be laid in same manner that other paving is put down, that is, by continuous operation not limited to definite dimensions on areas. One of principal advantages of this method lies in fact that coefficient of wear of cast-iron braces is less than that of concrete between braces.

Reinforcement. Reinforcement Checks Cracking of Concrete Pavements, W. S. Edge. Eng. News-Rec., vol. 92, no. 5, Jan. 31, 1924, pp. 190-193, 3 figs. Weight and bond vital factors; location affects efficiency; faulty placing common; describes ideal construction.

Single-Track. Advantages of Single Track Concrete Roads, A. M. Jackson. Can. Engr., vol. 46, no. 10, Mar. 4, 1924, pp. 304-305. Principal features of a concrete road built in Brant county, Ont.; one-half concrete and other half gravel; construction methods; construction and maintenance costs. See also Can. Engr. vol. 38, no. 10, Mar. 5, 1924, pp. 241-243 and Eng. & Contracting (Roads & Streets), vol. 61, no. 4, Apr. 2, 1924, pp. 718-721.

Slab Reinforcement. New Type of Slab Reinforcement For Concrete Roads, C. N. Conner. Eng. News-Rec., vol 93, no. 24, Dec. 11, 1924, p. 954, 1 fig. Uniform mesh reinforcement strengthened at slag edges by second mesh in 18-in. strips; major members transverse.

Subgrade Insulating. A Method of Insulating the Subgrade of Concrete Roads, R. R. Dobelbower. Eng. & Contracting (Roads and Streets), vol. 61, no. 1, Jan. 2, 1924, pp. 55-56, 1 fig.

Surface Faults. Surface Faults in Concrete Roads, J. H. Walker. Surveyor & Mun. & County Engr., vol. 65, no. 1692, June 20, 1924, pp.

569-570, 12 figs. Causes of and remedy for grooving. Surface treatment of concrete.

Swamp Land. Piles Through Old Swamp Roadbed Carry Concrete Road, C. N. Conner. Eng. News-Rec., vol. 93, no. 22, Nov. 27, 1924, pp. 872-873, 3 figs. Describes unusual and satisfactory type of heavy roadway construction through swamp land designed and constructed in coastal plain of North Carolina; road was reinforced like flat slab floor in building.

Tests. Comparative Utility of Concrete Pavement Tests, J. G. Bragg. Eng. News-Rec., vol. 92, no. 24, June 12, 1924, pp. 1012-1014. Results and analyses of four methods of testing concrete pavement; control specimens save money, and give adequate information.

Static Load Tests on Pavement Slabs, J. T. Thompson. Pub. Roads, vol. 5, no. 9, Nov. 1924, pp. 1-6, 12 figs. See also Pub. Wks., vol. 55, no. 12, Dec. 1924, pp. 364-366, 6 figs. Conclusions from tests conducted by U. S. Bur. Pub. Roads during summer of 1924. Description of slabs, and test methods and apparatus. Effect on static resistance of character of subgrade, reinforcement, and bituminous top.

Wear of Concrete Pavements Tested, F. H. Jackson. Pub. Roads, vol. 5, no. 3, May 1924, pp. 1-19, 14 figs. See also (abstract) in Eng. News-Rec., vol. 92, no. 23, June 5, 1924, pp. 984-985, 1 fig. Report of accelerated tests by U. S. Bur. of Pub. Roads show (1) no wear from rubber-tired wheels; (2) no strength-wear relation.

White Joint Filler. White Joint Filler for Concrete Roads, L. G. Carmick. Pub. Roads, vol. 5, no. 3, May 1924, pp. 21-22, 4 figs. Two-years' trial shows value of new material.

ROADS, EARTH

Bituminized. A Practical Experiment in Bituminized Earth Road Construction, K. A. Clark. Contract Rec., vol. 38, no. 45, Nov. 5, 1924, pp. 1096-1098 and 1112, 3 figs. See also Eng. & Contracting (Roads & Streets), vol. 62, no. 4, Oct. 1, 1924, pp. 731-734, 2 figs. A 500-ft. section of a heavily travelled road near Edmonton, Alberta, was treated successfully with asphalt extracted from bituminous sand. No gross defects have appeared under traffic.

Oiled. Oil Test Roads Furnish Valuable Information in Illinois. H. F. Clemmer and F. L. Sperry. Highway Engr. & Contractor, vol. 10, no. 5, May 1924, pp. 37-40, 6 figs. See also Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 446-447 and Eng. & Contracting (Roads & Streets), vol. 61, no. 3, Mar. 5, 1924, pp. 497-502, 3 figs. Details regarding tests made by Illinois State Division of Highways in spring of 1923 on Cambridge test road, 3 miles in length and divided into 15 separate sections, and on Rosemond road, divided into 16 sections. Physical and chemical characteristics of oils used on experimental roads; results with oil applied in varying quantities and number of treatments; preparation and shaping of road for oiling; drainage; application of oil; etc.

Points to Consider in the Successful Application of Road Oil, F. W. Padgett. Nat. Petroleum News, vol. 16, no. 12, Mar. 19, 1924, pp. 87-88. Discusses briefly methods of oiling, precautions to be observed, and selection of oils, for earth and gravel roads and streets.

ROADS, GRAVEL

Bituminous Surface Treatments. Service Tests of Bituminous Surface Treatments on Gravel Roads in Washtenaw County, Michigan, A. R. Bailey. Good Roads, vol. 66, no. 4, Apr. 1924, pp. 103-105. Describes experiments made, object of which was to obtain a dustless road at about same or slightly higher cost than was being experienced in usual gravel maintenance where dust laying was only partly accomplished.

Corrugations. Rhythmic Corrugations in Gravel Roads, Geo. E. Ladd. Pub. Roads, vol. 5, no. 7, Sept. 1924, pp. 18-20 and 22, 2 figs. Study of nature of "chatter bumps" and their relation to traffic.

The Prevention of Corrugations in Gravel Roads Carrying Heavy Traffic, A. H. Hinkle. Good Roads, vol. 67, no. 3, Sept. 1924, pp. 77-78. How corrugations are formed; necessity of maintenance; methods of reducing or preventing corrugations.

Maintenance. Gravel Road Maintenance in Michigan, G. C. Dillman. Can. Engr., vol. 46, no. 17, Apr. 22, 1924, pp. 453-454. Bituminous treatment for gravel surfaces; calcium chloride used extensively for dust laying.

Method for Maintaining Gravel Roads, P. D. Sargent. Can. Engr., vol. 47, no. 1, July 1, 1924, pp. 115-118. See also Eng. & Contracting (Roads & Streets), vol. 62, no. 2, Aug. 6, 1924, pp. 295-300. Outstanding method employed in Maine for maintaining gravel roads; maintenance by patrol method; standard practice and costs of maintenance.

The Construction and Maintenance of Gravel Roads, J. H. Mullen. Eng. & Contracting (Roads & Streets), vol. 61, no. 3, Mar. 5, 1924, pp. 518-521. Address before Am. Assn. State Highway Officials annual meeting.

Tar Surface. Tar Surface Treatments Preserve Gravel Roads, J. T. Donaghey. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 70-73, 3 figs. Economical where traffic exceeds 300 vehicles; method of application important.

ROADS, MACADAM

Bituminous. See ROADS, BITUMINOUS, Construction.

Penetration, Maintenance With Tarvia. City Street Maintenance with Tarvia, G. E. Martin. Eng. & Contracting (Roads and Streets), vol. 61, no. 1, Jan. 2, 1924, pp. 52-54, 4 figs. Methods employed at Jefferson City, Mo., in patching and surface treatment of penetration macadam streets.

ROADS, TARRED

Consistency of Tars. Further Notes on the Consistency of Road Tars, D. C. Broome. Chem. & Industry, vol. 43, no. 6, Feb. 8, 1924, pp. 25T-27T. Account of experiments carried out in order to throw further light on following problems: addition of powdered fillers; addition of bitumens; maintenance of tar at elevated temperature for long periods.

ROCK CRUSHING

Crushers. See CRUSHERS.

Plants. Duluth Crushed Stone Company's Plant, F. A. Alter. Rock Products, vol. 27, no. 13, June 28, 1924, pp. 39-42, 13 figs. Particulars of plant which has an unusual installation of crushers. Crushers designed by Allis-Chalmers Mfg. Co. and known as N Type; features are shorter shaft than usual and forced-feed lubricating system; plant has no elevators.

Modern Stone Crushing Plant at Dundas. Can. Engr., vol. 46, no. 3, Jan. 15, 1923, pp. 141-145, 9 figs. Describes new up-to-date plant of Canada Crushed Stone Corpn. Ltd., at Dundas, Ont.; primary crusher is a mammoth McCully with double discharge having 42 by 136-in. opening, driven by 250-hp. Westinghouse motor with English system rope drive; describes the various buildings.

New All-Steel Crushing Plant of Mid-West Crushed Stone Company, F. A. Alter. Rock Products, vol. 27, no. 18, Sept. 6, 1924, pp. 27-32, 18 figs. Describes all-steel plant built to replace wooden structure destroyed by fire; quarry operation, feeding crushers, crushing plant, etc.

Remarkable Side-Hill Rock-Crushing Plant, E. C. Barkstrom. Rock Products, vol. 27, no. 4, Feb. 23, 1924, pp. 30-37, 23 figs. Describes Graham Bros., Inc., plant on Santa Catalina Island, Cal.

ROCK DRILLS

Cost of Operation. Comparative Cost of Rock Drilling Underground, T. G. Hanton. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 267-285. Records of various types of rock drills in use at Mining Dept. of Zinc Corpn.; data on internal water-feed hammer drills when used for same work as older reciprocating drills for purpose of comparison.

Hammer Type. The New Hardy-Simplex Hammer Drill. Iron & Coal Trades Rev., vol. 109, no. 2956, Oct. 24, 1924, p. 663, 5 figs. New design introduces innovations in valve and ratchet device.

Leyner System. Preventing the Creation of Fine (or Phthisis Producing) Dust when Drilling Rock with Air Operated Machine Drills of "Leyner" Type, J. H. Veasey. S. African Instn. Engrs.—Jl., vol. 22, no. 10, May 1924, pp. 153-168, 13 figs. Development of Leyner's rock drill; long-piston hammer drills.

Problems. Rock Drill Troubles in Mining, H. L. Terwilliger. Min. & Metallurgy, vol. 5, no. 216, Dec. 1924, pp. 577-579. Advances made by Leyner machines; the Carr bit; best length for shanks.

Steel for. See STEEL, Rock-Drill.

ROLLER BEARINGS. See BEARINGS, ROLLER.

ROLLERS

Land. See FARM MACHINERY, Rollers.

Road. See ROAD MACHINERY, Rollers.

ROLLING MILLS

Adjustable-Speed Drives. Adjustable Speed Drives for Rolling Mills, L. A. Umansky. Iron & Steel Engr., vol. 1, no. 9, Sept. 1924, pp. 515-532, 27 figs. Discusses advantages to be derived from use of adjustable-speed drive, and necessary speed range and capacity; elementary cases of speed-regulation problems; comparison and selection of systems.

Alloy-Steel Rolling. Rolling Alloy Steel, J. Clausen. Blast Furnace & Steel Plant, vol. 12, no. 2, Feb. 1924, pp. 113-116 and 133, 5 figs. Practice at plant of Harrisburg Pipe & Bending Co.

Atlantic Steel Co., Atlanta, Ga. A Southern Rolling Mill, M. P. Lawton. Blast Furnace & Steel Plant, vol. 12, no. 6, June 1924, pp. 291-294 and 305, 9 figs. Equipment and methods of Atlantic Steel Co.'s plant, Atlanta, for manufacture of hoop and cotton ties.

Automatic Cooling Beds. German Practice in Automatic Cooling Beds, H. Hilterhaus. Iron & Coal Trades Rev., vol. 109, no. 2955, Oct. 17, 1924, pp. 632-633, 5 figs. Discusses modern trends and describes two types of automatic cooling beds which have become standard, namely, type fitted with racks that are raised and lowered; and type with rotary and swinging racks, the latter being American in conception.

Bearings. See BEARINGS, ROLLER, Rolling-Mill.

Billet Mill. New Inland Merchant and Billet Mills, G. L. Lacher. Iron Age, vol. 114, no. 6, Aug. 7, 1924, pp. 303-307, 6 figs. Bar mill stands connected with single lineshaft; Kraemer set drive largest yet built; hot bed will take billet from complete ingot, Inland Steel Co., Indiana Harbor, Ind.

Blooming Mills. Builds New Blooming Mill in France. Iron Trade Rev., vol. 74, no. 16, Apr. 17, 1924, pp. 1046-1047, 3 figs. Details of new blooming mill erected in works of Société des Acieries de Longwy, built by Maschinenfabrik Sack, Düsseldorf, Germany; used for breaking down ingots into blooms either for 38-in. two-high reversing shape mill or for other smaller section mills, and in addition serves as slabbing mill for rolling slabs for plate mills.

Mechanical and Electrical Analyses of 40 Inch Blooming Mill Screwdown, F. D. Egan. Iron & Steel Engr., vol. 1, no. 7, July 1924, pp. 371-379, 42 figs. Electrification of 40-in. blooming mill of Lackawanna plant of Bethlehem Steel Co., replacing all steam and hydraulic drives.

Breaking Spindles for Main Drive. Breaking Spindles for Main Roll Drives, J. H. Albrecht. Iron & Steel Engr., vol. 1, no. 12, Dec. 1924, pp. 634-635, 2 figs. Describes combination flexible coupling and breaking spindle installed on 84-in. plate mill, Youngstown Sheet & Tube Co.

Butt-Weld Pipe Mills. New Butt Weld Mills at Indiana Harbor. Iron Age, vol. 114, no. 1, July 3, 1924, pp. 1-4, 5 figs. Mills, which are part of expansion program of Youngstown Sheet & Tube Co., will roll pipe from 1/8 up to 3 in. and will produce 400 tons daily.

Cold-Rolling. Cold Rolling Steel for the Hardware Industry, H. C. Hatch. Can. Machy., vol. 32, no. 24, Dec. 11, 1924, pp. 19-21 and 22, 5 figs. Physical characteristics and manufacture in plant of Stanley Steel Co.; quality is said to be largely dependent on skill of roller and condition of surface of rolls; suitability for plating an important property of product.

Cold-Rolling Strip Mills. Acme Steel Expands Cold Strip Capacity, G. L. Lacher. Iron Age, vol. 113, no. 5, Jan. 31, 1924, pp. 353-358, 7 figs. See also Iron Trade Rev., vol. 74, no. 5, Jan. 31, 1924, pp. 359-362, 8 figs. Features include recoiler, cooling gas for annealing, automatic roll grinder; material-handling facilities.

Continuous. Continuous Rolling-Mills: Their Growth and Development, Jos. P. Bedson. Iron & Steel Inst.—Advance Paper no. 3, for meeting May 1924, 18 pp., 6 figs., partly on supp. plates. See (abstract) in Engineering, vol. 17, no. 3045, May 9, 1924, pp. 620-622, 7 figs; also Iron Age, vol. 113, no. 21, May 22, 1924, pp. 1493-1495. Art as it was practiced 140 years ago; history of development; modern examples of continuous system.

Cooling Beds. Automatic Cooling Beds (Automatische Kühlbetten), H. Hilterhaus. Stahl u. Eisen, vol. 44, no. 27, July 3, 1924, pp. 777-786, 8 figs. Discusses arrangement of cooling beds and describes various types, including the Morgan, Edwards and Teba.

Copper-Wire-Rod. Copper Wire Rolling Mill at Brockville. Can. Engr., vol. 47, no. 16, Oct. 14, 1924, pp. 411-415, 9 figs. First mill of its kind ever operated in Canada is most modern and efficient yet built. All-Canadian electrical wire produced in September 1924 for first time. Bars refined at Trail, B. C., from Canadian ore, are rolled at Brockville, Ont., and drawn into wire at Montreal.

Electric Drive. Electrically Driven Reversing Rolling Mills at the Angleur Steel Works (L' equipement électrique du train réversible des Aciéries d'Angleur), M. Odier. Association des Ingenieurs Electriciens sorti de l'Institut Elec-

trotechnique Montefiore—Bul., vol. 2, series 7, no. 6, June 1924, pp. 206-235, 21 figs. Following general notes on Ilgner method of driving reversing mills, detailed description is given of combined blooming and finishing rail mill driven by single motor, for control of which two fly-wheel sets are provided; one of these forms a spare set, but will be used later with small mill not yet installed; curves of power consumption are given; plant has proved reliable in operation, and stoppages during year's working have been less than 24 hours.

Large-Powered Rolling Mill Drives. Engineering, vol. 118, no. 3077, Dec. 19, 1924, p. 842, 1 fig. Describes electrically driven gear for rolling-mill drive and heavy flywheel for use on Ilgner system to balance load on electric motor, constructed by Scott & Hodgson, Manchester, Eng.

The Bar Mill and Structural Mill Electrification of the Phoenix Iron Company, J. S. Erichson. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 403-407, 9 figs. Details of conversion from steam to electric drive, which consists of 3000-hp. 600-volt, compound-wound, compensated, adjustable-speed d.c. motor, driving through herringbone-gear unit.

The Electrical Drive of Rolling Mills, A. Hartmann. Brown Boveri Rev., vol. 11, nos. 2, 7, and 11, Feb., July, and Nov. 1924, pp. 31-37, 127-139, and 249-259, 58 figs. Discusses non-reversing rolling mills, motors, starters, regulating contrivances, rotary converters and commutator motors in cascade with main motor, conversion of 3-phase current to direct current. Nov.: Drive of non-reversing mills; advantages of electric drive.

Electric Motors. Rolling-Mill Motors With Double-Range Speed Regulation, A. Hartmann. Brown Boveri Rev., vol. 11, no. 6, June 1924, pp. 110-113, 7 figs. Discusses no-loss regulation systems developed by Brown Boveri & Co., especially Scherbius system in which commutator machine is connected in series with main motor.

Engines for. See STEAM ENGINES, Rolling-Mill.

Engines, Flywheels for. See FLYWHEELS, Rolling-Mill Engines.

Gear Drives. Gear Drives in the Sheet Mills, H. H. Talbot. Iron & Steel Engr., vol. 1, no. 12, Dec. 1924, pp. 607-612 and (discussion) 612-615, 15 figs. Discusses design of pinion stands and various types of units utilized for driving them; describes different types of drives.

Gripping of Rolls. The Gripping of Rolls at Variable Rolling Speed (Das Greifen von Walzen bei veränderlicher Walzgeschwindigkeit), W. Tabel and Er. Schneider. Stahl u. Eisen, vol. 44, no. 12, Mar. 20, 1924, pp. 305-309, 9 figs. Theory of gripping process; influence of quality of material; influence of rolling speed on coefficient of friction; critical speed for gripping; tests on smooth and rough rolls; most favorable rolling speed.

Hot Beds. New Type of Mechanical Hot Bed. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 990-991, 4 figs. See also Iron Trade Rev., vol. 75, no. 16, Oct. 16, 1924, pp. 1016-1017, 4 figs. Elliptical moving members insure proper advance of rails, billets, etc., with less direct transfer of heat, in hot bed developed by W. McKee, which represents radical change from present type.

Hot Strip Mills. A New 20-16 in. Hot Strip Mill, N. Jones and G. P. Wilson. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 710-715, 9 figs. Details of new plant of West Leechburg Steel Co., Pa., designed for thin strips, including outdoor substation equipment, with motors, speed regulations, etc.

New Sheet Bar and Hot Strip Mills, F. L. Prentiss. Iron Age, vol. 114, no. 18, Oct. 30, 1924, pp. 1141-1146, 9 figs. Otis strip mill continuous from furnace to coilers, without use of hot bed; electric drive throughout.

Oval Passes. Calculation of Oval Passes (Berechnung der Streckovalkaliber), E. Mercader. Stahl u. Eisen, vol. 44, no. 14, Apr. 3, 1924, pp. 361-363, 1 fig. Series of oval and square passes; processes in oval passes; measurement of oval and square passes.

Plate Mills. New Three-high Plate Mill at the Clydebridge Works of Messrs. David Colville & Sons, Ltd. English Elec. Jl., vol. 2, no. 6, Apr. 1924, pp. 311-319, 8 figs. Ilgner drive with slow-speed motor direct-coupled to mill and flywheel energy embodied in a separate motor-generator equalizer set. Plant designed to deal with 3000 tons of plates per week.

Power Consumption. Power Consumed in Rolling Steel, G. Fox. Iron & Coal Trade Rev., vol. 109, no. 2945, Aug. 8, 1924, pp. 235-236, 13 figs. See also Iron Age, vol. 113, no. 22, May 29, 1924, pp. 1564-1565, 1 fig.; and Iron Trade Rev., vol. 74, no. 22, May 29, 1924, pp. 1431-1433, 5 figs. Factors governing amount of power required for rolling steel; graphical presentation of power consumption as related to displacement of metal; load variation contingent upon rolling temperature.

Time Study and Measuring Power Consumption in Rolling Mills (Zeitstudien und Kraftverbrauchsmessungen im Walzwerk), G. Bulle. Stahl u. Eisen, vol. 44, no. 32, Aug. 7, 1924, pp. 937-941, 5 figs. Discusses formulation of rolling plan, determining times for rolling and handing by stop watch, training of workers, works inspection, furnace improvements, etc.

Pulverized Coal, Use in. See PULVERIZED COAL, Sheet Mills.

Rod Mills. Making Copper Rod From Ore Mined in Canada, H. C. Braund. Can. Machy., vol. 32, no. 21, Nov. 20, 1924, pp. 27-28 and 43. Describes plant of Eugene F. Phillips Elec. Wks., at Brockville, Ont., first and only copper rod rolling mill in operation in Canada. Capacity 120 tons a day.

Rolling Process. The Rolling Process with Special Consideration of Rolling Work and Flow Pressure (Einiges über den Fliessdruck), W. Tafel. Zeit. für Metallkunde, vol. 16, nos. 10 and 11, Oct. and Nov. 1924, pp. 391-395 and 430-432, 4 figs. Definition of "pushing force"; relation of flattening to radius of roll; increased speed of travel.

Rolls. See ROLLS.

Sheet Mills. Build Sheet Mill at Golden Gate. Iron Trade Rev., vol. 74, no. 21, May 22, 1924, pp. 1373-1375, 5 figs. Subsidiary of Metal & Thermit Corpn. completes new six-mill sheet plant at South San Francisco; oil fuel used in furnaces.

Detroit's New Automobile Sheet Plant. Iron Age, vol. 113, no. 1, Jan. 3, 1924, pp. 50-53, 8 figs. Features of works of Michigan Steel Corpn. include short hauls to and from rolls and quick drying of washed sheets.

Enlarges Semifinishing Capacity, J. D. Knox, Iron Trade Rev., vol. 75, no. 22, Nov. 27, 1924, pp. 1431-1433, 3 figs. How plant of United Alloy Steel Corpn., Canton, Ohio, increased production by combining discarded rolling equipment with 3-high sheet-bar mill; describes present layout.

Loose Rolling Gains Favor Among Sheetmakers, J. D. Knox. Iron Trade Rev., vol. 75, no. 26, Dec. 25, 1924, pp. 1706-1711 and 1722, 9 figs. Youngstown company installs new 8-mill plant for manufacture of high-grade automobile sheets.

Sheet Mill Represents Latest Practice, E. H. Werner. Forging—Stamping—Heat Treating, vol. 10, no. 4, Apr. 1924, pp. 153-158, 10 figs. New mill of Nat. Enameling & Stamping Co. at Granite City, Ill.; mill equipment and furnaces.

Sheet Steel Plant on Pacific Coast. Iron Age, vol. 113, no. 23, June 5, 1924, pp. 1650-1652, 5 figs. Six-mill installation put in operation by Pac. Sheet Steel Corpn. at South San Francisco, Cal.; blue annealed, black and galzanized sheets to suit local market.

Steam-Driven. Steam Engines for Driving Rolling-Mill Trains (Dampfmaschinen zum Antrieb von Walzenstrassen). Hanomag-Nachrichten, vol. 11, no. 129-130, July-Aug. 1924, pp. 116-121, 11 figs. Application of piston engines as flywheel engine and reversing engine for mill trains; details of engine with currents in same direction, combining greatest capacity for regulating with large excess load and highest economy.

Three-High Mills. Four-Roll System for Three High Mills (Das Vierwalzensystem für Triowalzwerke), H. Cramer. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Walzwerksausschuss), no. 34, Jan. 30, 1924, 4 pp., 4 figs. See also Stahl u. Eisen, vol. 44, no. 39, Sept. 25, 1924, pp. 1170-1172, 2 figs. Blind passes and how to avoid them; expediency of using a second middle roll; accurate control of rolls; etc.

Tolerances in Rolling Sheets. Tolerances in the Rolling of Steel Sheets. Iron Age, vol. 113, no. 7, Feb. 14, 1924, pp. 497-499. Causes of variations from gage and reasons for current practice presented from mill standpoint.

ROLLS

Alloy-Steel. Producing Hardened and Ground Rolls, J. R. Adams. Abrasive Industry, vol. 5, no. 7, July 1924, pp. 168-170, 6 figs. Discusses rolls of composition C 0.70 to 1.25, Mn 0.20 to 0.40, Si 0.15 to 0.30, Cr. 1.50 to 2.50 per cent, their production in electric furnace, hardening of surfaces, grinding; microscopic and scleroscopic and other tests.

Bearings for. Roll Bearings for Cold Rolling Mills, C. E. Davies. Engineering, vol. 118, nos. 3069, 3070, and 3071, Oct. 24, 31, and Nov. 7, 1924, pp. 569-571, 601, and 636-637, 23 figs. Reviews and compares various designs, materials, and lubrication systems for cold-roll bearings in general use in England and abroad.

Casting. Vertical Pouring of Rolling Mill Rolls (La coulée en chute appliquée aux cylindres de laminoirs). Fonderie Moderne, vol. 18, June 1924, pp. 143-146, 5 figs. Used in place of bottom casting in metal mold, with hottest part at top.

Electric Heating of. Electric Heating of Sheet and Tin Mill Rolls, G. Fox. Blast Furnace & Steel Plant, vol. 12, no. 11, Nov. 1924, pp. 493-496, 5 figs. Method and advantages of electric preheating of finishing rolls of sheet and tin mills.

Forged-Steel. Hardened and Ground Forged Steel Rolls, J. R. Adams. Forging—Stamping—Heat Treating, vol. 10, no. 7, July 1924, pp. 255-260, 10 figs. Discusses composition, melting and forging, annealing, machining, hardening, grinding, and use of rolls. Forged-steel rolls possess advantages over chilled-iron rolls of greater hardness, more homogeneous surface, greater strength and longer life.

Grinding. How Chilled Iron Rolls are Ground. Abrasive Industry, vol. 5, no. 5, May 1924, pp. 119-122, 5 figs. Special machines are provided for finishing steel-mill rolls. Value of grinding over turning.

Grooves, Filling. The Filling of Roll Grooves (Füllung der Walzkaliber), W. Tafel and H. Weiss. Stahl u. Eisen, vol. 44, no. 41, Oct. 9, 1924, pp. 1243-1245, 3 figs. Review of former attempts to correct deviation of computed and actual fillings of passes; describes two new methods which very nearly accomplish this purpose.

Hardened and Ground. Hardened and Ground Rolls, J. R. Adams. Iron Age, vol. 113, no. 22, May 29, 1924, pp. 1561-1563, 2 figs. See also Iron Trade Rev., vol. 74, no. 22, May 29, 1924, pp. 1426-1428, 6 figs.; and Foundry Trade Jl., vol. 30, no. 420, Sept. 4, 1924, pp. 200-201. History of development and use of forged steel rolls, hardened and drawn. (Abstract.) Paper read before Am. Iron & Steel Inst.

ROOF TRUSSES

Fink. The Fink Roof Truss and Its Problem, R. Fleming. Can. Engr., vol. 47, no. 11, Sept. 9, 1924, pp. 309-312, 6 figs. Various graphical solutions given of problem of Fink truss; methods of general case and their originators given.

ROOFING

Asphalt Tar for. See TAR, Asphalt for Roofing.

Slate. See SLATE, Roofing.

ROOFS

Asbestos Corrugated. Asbestos Corrugated Sheathing. Contract Rev. & Eng. Rev., vol. 38, no. 17, Apr. 23, 1924, pp. 403-404, 3 figs. Correct method of applying the material as roofing and siding; same labor as for corrugated iron.

Asphalt. Economic Factors in Roofing Manufacture, J. L. McK. Yardley. Chem. & Met. Eng., vol. 31, no. 17, Oct. 27, 1924, pp. 559-663, 3 figs Making granulated slate; how asphalt is obtained; roofing-mill operating costs.

Master Specification for Asphalt for Unsurfaced built-up Roofing. Eng. Wld., vol. 25, no. 5, Nov. 1924, pp. 309-311, 3 figs. Specification officially adopted by U. S. Bur. Standards Federal Specifications Board on June 1, 1924, for use of Departments and Independent Establishments of Government in purchase of asphalt for unsurfaced built-up roofing. Fed. Spec. Bd., Spec. no. 88.

United States Government Master Specification for Asphalt Primer for Roofing and Waterproofing. U. S. Bur. Standards—Circular no. 162, Master Specification no. 87, Apr. 8, 1924, 7 pp., 2 figs. Specification officially adopted by Federal Specifications Board on Dec. 29, 1923, for use of Departments and Independent Establishments of the Government in purchase of asphalt primer for roofing and waterproofing.

United States Government Master Specification for Asphalt for Mineral-Surfaced Roofing. U. S. Bur. Standards—Circular no. 159, Master Specification no. 84, Apr. 8, 1924, 10 pp., 3 figs. Specification officially adopted by Federal Specifications Board on Dec. 29, 1923, for use of Departments and Independent Establishments of the Government in purchase of asphalt for mineral-surfaced roofing.

See also ASPHALT, Roofing, Specifications.

Built-up, Roofing. United States Government Master Specification for the Construction of Built-Up Roofing, Types 3ACS and 5ACS. U. S. Bur. Standards—Circulars nos. 172 and 174, July 8, 1924, 3 pp. and 4 pp. Specifications adopted June 1, 1924, for built-up roofing types 3ACS and 5ACS covering material and workmanship, inspection, packing and marking, etc.

Coal-Tar Pitch for. United States Government Master Specification for Coal-Tar Pitch for Roofing. U. S. Bur. Standards—Circular no. 157, Master Specification no. 80, Apr. 8, 1924, 10 pp.,

3 figs. Specification officially adopted by Federal Specifications Board on Dec. 29, 1923, for use of Departments and Independent Establishments of the Government in purchase of coal-tar pitch for roofing.

Concrete Tile for. See TILE, Concrete Roofing.

Domed. A Domed Roof Construction. Am. Architect & Architectural Rev., vol. 126, no. 2462, Dec. 31, 1924, pp. 635-640, 6 figs. Notes on design and construction of dome of First Church of Christ, Scientist, University City, Mo. Span approximately 74 ft., inner and outer surfaces segmental in form with radii of 58 ft. 8 in. and 41 ft. respectively.

Felt, for Manufacture. Making Felt From Waste, A. W. Allen. Chem. & Met. Eng., vol. 30, no. 2, Jan. 14, 1924, pp. 45-48, 7 figs. Describes operation of plant that absorbs waste fabric of all descriptions from foreign and domestic sources; incorporated with manufacture of felt is byproduct of Californian petroleum refining, asphalt; layer of mineral surfacing and backing of mica are added, and finished product is sold in form of rolled sheets and as shingles.

Heat Insulation of. See INSULATION, HEAT, Roofs.

Prepared, Manufacture of. Some Relations between Maintenance and Operating Costs, J. L. McK. Yardley. Indus. Engr., vol. 82, no. 12, Dec. 1924, pp. 566-570 and 601, 4 figs. Equipment and operation of roofing felt mill; layout and operation of roofing mill; equipment required in roofing-asphalt refinery.

Reinforced-Concrete. Reinforced-Concrete Roof Covering [Couverture en ciment armé du quai nord-ouest du port de Sfax (Tunisie)], F. Willm. Génie Civil, vol. 85, no. 19, Nov. 8, 1924, pp. 424-426, 7 figs. Design and construction of roof covering over northwest quay of port of Sfax, Tunnis.

Sawtooth Construction. A Modern Type of Saw-Tooth Roof Construction. Am. Architect, vol. 126, no. 2449, July 2, 1924, pp. 25-29, 12 figs. Two sets of trusses are used, transverse and longitudinal. Illustrated by examples designed by Ballinger Co., Phila., Pa.

Trusses. See ROOF TRUSSES.

Zinc. Zinc Used for Roofing, Chas. E. van Barneveld. U. S. Bur. Mines—Report of Investigations, no. 2652, Nov. 1924, 10 pp., 5 figs. Information contained in report is by-product of studies concerning zinc, and is published in response to various inquiries for information as to suitability of zinc for roofing; available forms and advantages of zinc roofing; zinc-roof construction; zinc shingles.

ROPE

Manila. See BALLOONS, Manila Rope for.

Wire. See WIRE ROPE.

ROPEWAYS. See CABLEWAYS.

ROUNDHOUSES. See ENGINEHOUSES.

RUBBER

Absorption of Water by. The Rate of Absorption of Water by Rubber, D. H. Andrews and J. Johnston. Am. Chem. Soc.—Jl., vol. 46, no. 3, Mar. 1924, pp. 640-650, 2 figs. Investigation of described phenomenon as means of learning more about mechanism of absorption of water in rubber, and to be able to predict, from behavior of thin sheets, time required for given degree of saturation of thick sheet immersed in water.

Accelerators. Recent Developments in Rubber Accelerators, Julian F. Smith. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1024-1026, 2 figs. Non-technical summary of various uses of accelerators.

Rubber Vulcanising Accelerators, G. C. Martin. Rubber Age, vol. 4, no. 11, Jan. 1924, pp. 609-614 and (discussion) 614-616. Classification of accelerators; conditions of curing; effect of resin acids; physical properties compared; potency of accelerators; vulcanization coefficients.

The Determination of the Activity of an Accelerator of Vulcanization, G. Martin and W. S. Davey. Chem. & Industry, vol. 43, no. 8, Feb. 22, 1924, pp. 31T-34T, 1 fig. Factors affecting activity of accelerator in mix containing rubber, sulphur, zinc oxide and accelerator are (1) purity, concentration, and specific surface of substances used, and (2) temperature of vulcanization.

The Use of Diphenylguanidine as an Accelerator of Vulcanization, W. M. Ames. Chem. & Industry, vol. 43, no. 17, Apr. 25, 1924, pp. 117T-124T, 4 figs. Study of properties of diphenylguanidine and summary of results.

Aging. The Aging of Rubber. India-Rubber Jl., vol. 67, no. 5, Feb. 2, 1924, pp. 17-18 and 21-22. Changes which take place during aging, means by which an estimate can be made of rate at which such changes will take place, and possible methods by which these changes can be prevented. See also discussion in no. 6, Feb. 9, 1924, pp. 15-18, by S. A. Brazier.

British Empire Exhibition. Rubber at the British Empire Exhibition. Rubber Age, vol. 5, nos. 4 and 5, June and July 1924, pp. 174-180 and 228-231, 15 figs. Account of the various rubber goods exhibited by different firms.

Coatings, Electrodeposition of. The Electrodeposition of Rubber Coatings. India-Rubber Jl., vol. 67, no. 9, Mar. 1, 1924, pp. 19-20, 1 fig. Patented method by which rubber coatings may be deposited and conditioned on articles having conducting surface.

Compounding Ingredients. Compounding Ingredients in Rubber Manufacture, H. T. Hewlett. India-Rubber Jl., vol. 68, no. 5, Aug. 2, 1924, pp. 115-117. Function of compounding ingredients; rubber substitute; pigments; zinc oxide and lithopone; ingredients employed for their resistant qualities; advance in knowledge of compounding ingredients.

Consistency. The Consistency of Rubber and Rubber Compounds, S. S. Pickles. India-Rubber Jl., vol. 67, nos. 2 and 3, Jan. 12 and 19, 1924, pp. 17-20 and 11-19 and (discussion) 19-21, 6 figs. See also Rubber Age, vol. 4, no. 12, Feb. 1924, pp. 662-674 and (discussion) 674-677, 6 figs. Hardness of raw rubber; consistence of vulcanized rubber and effects of accelerators; hardness of vulcanized rubber; softening of rubber and rubber softeners; grain effects in rubber; tearability of and knotting in rubber.

Cotton-Reinforced. The Development of Cotton Reinforced Rubber, J. H. Stedman. India Rubber World, vol. 69, no. 5, Feb. 1, 1924, pp. 289-290, 3 figs. Evolution of reinforced rubber; reinforced rubber in relation to rubber production; possibilities and advantages; extent of market; etc.

Disk-Spray Process. Disk-Spray Process Revolutionizes Rubber Industry, A. M. Hoffman. Compressed Air Mag., vol. 29, no. 10, Oct. 1924, pp. 1025-1026, 4 figs. Description of process which provides new and much improved method for mixing crude rubber with various ingredients which must be added to it during manufacture of basic rubber compounds required for making of different trade articles.

Gutta Percha. See GUTTA PERCHA.

Hand, Grinding, Safety in. See DUST, Explosion Prevention.

Kerbosch. Kerbosch Rubber, O. deVries. India-

Rubber Jl., vol. 68, no. 1, July 5, 1924, pp. 17-23. Describes experiments made in years 1914-1921 and data about keeping properties of crude and vulcanized product; results of tests and investigations of Kerbosch rubber.

Latex. Putting Rubber Latex to New Uses, R. Ditmar. Chem. & Met. Eng., vol. 30, no. 12, Mar. 24, 1924, p. 474. Brief outlines of methods for impregnation or coating of fabrics, wood, Stone, etc.

Rubber Latex: Its Properties and the Development of Its Industrial Applications, A. Van Rossem. India-Rubber Jl., vol. 68, nos. 22 and 23, Nov. 29 and Dec. 6, 1924, pp. 1081-1085 and 1123-1127, 1 fig. See also Rubber Age, vol. 5, no. 10, Dec. 1924, pp. 523-533 and (discussion) 533-538. Microscopical examination; physico-chemical properties; latex as a colloidal system; coagulation process; industrial applications in rubber industry and application in other industries; preservation and concentration of latex.

The Use of Rubber Latex, F. Kaye. Rubber Age, vol. 5, no. 1, Mar. 1924, pp. 17-21. See also India-Rubber Jl., vol. 67, no. 6, Feb. 9, 1924, pp. 19-22 and 24. Variation in qualities of latex; latex preservatives; results achieved in use of rubber latex in making of boards, leather substitutes, linoleum substitutes, etc.

Latex Coagulation. The Rôle of Enzymes in the Coagulation of Hevea Latex, O. DeVries. Rubber Age, vol. 5, no. 5, July 1924, pp. 241-243. Results of investigations made on coagulation phenomena in Hevea latex to elucidate rôle played by enzymes.

Machinery. The Trend of Development in Rubber Machinery and the Field for Innovation, H. C. Young. India-Rubber Jl., vol. 68, no. 5, Aug. 2, 1924, pp. 169-184, 28 figs. Notes on dust prevention; ventilation and heating; cooling waters; hydraulic and electrical machinery; internal mixers; calenders; future extruding machine; standard vulcanizing plant; labor-saving devices.

Mechanical Structure. The Mechanical Structure of Rubber, R. W. Lunn. India-Rubber Jl., vol. 67, nos. 12 and 13, Mar. 22 and 29, 1924, pp. 15-18, and 9-11 and (discussion) 11-12 and 15-16, 3 figs. See also Rubber Age, vol. 5, no. 2, Apr. 1924, pp. 68-75 and (discussion) 75-79, 3 figs. Discusses rubber in latex, mechanism of coagulation, structure indicated in technical manipulation, structure of vulcanized rubber in relation to its physical properties, structure in relation to thermal properties of vulcanized rubber, speculation on spheroidal theory, and abrasion resistance.

Plasticity. The Plasticity of Rubber and Its Measurements, I. Williams. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 362-364, 5 figs. Apparatus for measurement of plasticity consisting of two parallel plates between which sample is placed; curve showing thickness against time is obtained when plates are forced together by known weight.

Preparation, Fuel Economy in. See FUEL ECONOMY, Rubber Preparation.

Solvents. Nature and Uses of Rubber Solvents, R. M. Fitzpatrick. Rubber Age, vol. 5, no. 2, Apr. 1924, pp. 86-90, 5 figs. General discussion on nature, manufacture, and testing of solvents, and account of their action on rubber and their behavior in use.

Tensile Strength. The Tensile Strength of Rubber, O. de Vries. Chem. & Industry, vol. 43, no. 10, Mar. 7, 1924, pp. 47T-52T, 1 fig. Figures for tensile strength are influenced by length of time that rubber is heated during vulcanization; special experiments did not point with certainty to deteriorating influence of sea voyage on tensile strength of crepe rubber.

Testing. Physical Testing of Rubber and Factory Practice, P. Schidrowitz. Rubber Age, vol. 5, no. 3, May 1924, pp. 129-133 and (discussion) 133-137. Early researches; recent developments of physical testing; discusses plasticity, tensile, abrasion, tearability, hardness, rigidity, elasticity, hysteresis, traction, bending and compression, and other tests.

Uses. New Uses for Rubber, P. J. Burgess. Roy. Soc. Arts—Jl., vol. 72, no. 3721, Mar. 14, 1924, pp. 276-284 and (discussion) 284-287. Direct use of latex; use of crepe rubber for shoe and boot soles; tires; use for road surfaces and paving.

Vulcanization. A Contribution to the Study of the Vulcanization of Rubber in the Sol and Gel Form, F. Boiry. India-Rubber Jl., vol. 68, nos. 11, 12, 13, 14, and 15, Sept. 13, 20, 27, Oct. 4, and 11, 1924, pp. 7-10, 9-11, 9-10 and 13, 13-15, and 7-8. Sept. 13: Vulcanization of dilute rubber solutions. Sept. 20: Vulcanization of concentrated solutions. Sept. 27: Kinetics of vulcanization in concentrated solutions. Oct. 4: Microscopic examination of gels. Oct. 11: Nature of vulcanization. Translated from French.

The Acceleration of Vulcanization, L. B. Sebrell and W. W. Vogt. Indus. & Eng. Chem., vol. 16, no. 8, Aug. 1924, pp. 792-796, 5 figs. Influence of acetone-soluble constituents of rubber on physical and chemical properties of accelerated rubber stocks.

See also Accelerators.

RUBBER INDUSTRY

Italy. The Italian Rubber and Insulated Wire Industry, M. Luzzatto. India-Rubber Jl., vol. 68, no. 5, Aug. 2, 1924, pp. 151-152. History of industry; data on number of factories, production, exports and imports.

United States. The United States Rubber Industry. India Rubber Wld., vol. 70, no. 6, Sept. 1, 1924, pp. 789-790. Discusses home market; magnitude of industry; crude rubber consumption; tire industry; footwear manufacture; rubber hose and belting; heels and soles; world's dependence on rubber.

RUDDERS

Electrically-Driven. Electrically-Driven Rudders With Differential Gearing (Die elektrisch angetriebene Rudermaschine mit Differentialrädern), F. Grabe. Schiffbau, vol. 25, no. 23, Sept. 10, 1924, pp. 623-627. Details of Aegir rudder; improvements made and still to be made; power consumption of motors.

Flettner. The Flettner Rudder (Das Flettner-Ruder), W. Parey. Dinglers Polytechnisches Journal, vol. 339, no. 4, Feb. 1924, pp. 29-32, 4 figs. Details of principle of Flettner rudder, in which auxiliary smaller rudder is used for actuating main rudder; its advantages in saving space and cost, etc.

The New 3-Plane Flettner Rudder. Shipbldg. & Shipg. Rec., vol. 24, no. 13, Sept. 25, 1924, pp. 366-367, 4 figs. First practical application in 4500-ton deadweight motorship; successful demonstration on trial trip.

RULING MACHINES

Grating. Ruling 15,000 Lines per Inch, F. A. Stanley. Am. Mach., vol. 60, no. 5, Jan. 31, 1924, pp. 161-166, 11 figs. Machine for ruling gratings and how it was built; lapping lead screw to correct errors; testing corrections with interferometer.

RUST. See CORROSION, Iron and Steel; Rust Removal.

RUST PREVENTION. See PAINTS, Rust-Preventive.

S

SAFES

Bank-Vault Construction. Outwitting the Safe-Breaker, H. R. Simonds. Iron Trade Rev., vol. 74, no. 6, Feb. 7, 1924, pp. 415-419, 10 figs. By use of alloy and special steels impervious to attack by cutting torch, engineers have succeeded in building bank vaults which are impregnable; special machine tools and accurate finishing of work play important part.

Finishing. How Abrasive Processes Finish Bank Vaults and Safes, H. R. Simonds. Abrasive Industry, vol. 5, no. 8, Aug. 1924, pp. 201-205, 12 figs. Describes various abrasive operations pursued in manufacture of safes built by York Safe & Lock Co., York, Pa.

Reinforced-Concrete. The Fortis Reinforced Concrete Safes and Strong Room Doors. Engineering, vol. 117, no. 3029, Jan. 18, 1924, pp. 72-73, 8 figs. Describes safes in which reinforced concrete is used for whole body of safe, as well as doors.

SAFETY

Coal Mines. See COAL MINES, Safety.

Mine Hoists. See HOISTS, Mine, Safety Devices for.

Mining Industry. See MINES, Safety Problems.

SAFETY CODES

Aeronautical. The American Aeronautical Safety Code, A. Halsted. Nat. Safety News, vol. 10, no. 3, Sept. 1924, pp. 27-29, 4 figs. Purpose of code is to establish uniform safety standards for construction and maintenance of aircraft and for their operation and flight, especially at airdromes.

Coal-Mining. See COAL MINES, Safety.

Forging. See FORGING, Safety Code for.

Quarries. See QUARRIES, Safety Code for.

SAFETY LAMPS

Testing Tanks for Combustible Gases. Use of Koehler Safety Lamp in Testing Tanks for Combustible Gases or Vapors, Rob. E. Wilson and Rob. E. Wilkin. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1154-1156, 2 figs Koehler lamp is recommended as means of testing tanks and other inclosed spaces for freedom from explosive concentrations of combustible gases; series of tests to determine effect of flame height on various concentrations of gasoline in air.

SALT

Malagash, Nova Scotia. The Salt Deposits of Malagash, Nova Scotia, A. R. Chambers. Can. Inst. Min. & Metallurgy—Bul., no. 145, May 1924, pp. 276-285, 4 figs. Notes on geology and mining.

Mining and Preparation, Kansas. Working the Kansas Salt Deposits, C. A. Lovell. Chem. & Met. Eng., vol. 30, no. 11, Mar. 17, 1924, pp. 426-429, 7 figs. How basic raw material of chemical industry is mined and prepared for user at plant of Carey Salt Co., Hutchinson, Kan.

Mining Plant. A Model Salt-mining Plant at Retsof, N. Y., A. B. Parsons. Eng. & Min. Jl.-Press, vol. 117, no. 25, June 21, 1924, pp. 997-1005, 25 figs. Plant with capacity for mining, hoisting, crushing, and sizing 3000 tons of rock salt per 8-hr. shift. Largest installation of its kind in world. Equipment much the same as that used in mining and milling metal and other non-metal ores.

Separation from Brines. Conquering Natural Brines for Commerce, C. T. Bragg and W. P. Putnam. Chem. & Met. Eng., vol. 31, no. 12, Sept. 22, 1924, pp. 468-469. Report of investigation of an ingenious process, patented by C. E. Dolbear, by which a complicated brine may be separated into its constituent salts.

SALTS

Melting Points. Some New Standard Melting Points at High Temperatures, H. S. Roberts. Physical Rev., vol. 23, no. 3, Mar. 1924, pp. 386-395, 5 figs. Melting points of salts for use as standard temperatures for thermocouples, 400 to 1100 deg. cent.; gives convenient method of using pure metal strips or wires in calibrating couples.

SAND

Bituminous. See BITUMINOUS SANDS.

Concrete. See CONCRETE, Sand, Selection of.

Filter. Filter Sand for Municipal Water Supply, W. M. Weigel. U. S. Bur. Mines—Reports of Investigations, no. 2622, July 1924, 6 pp. Study of sand for this purpose; requirements; chemical analysis; specifications; sources of supply; methods of mining and preparation. Bibliography.

Progress Report of Committee No. 18 on Filter Sand Analysis. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 677-690, 1 fig. Historical sketch of examination of filter sand; Hazen's method; Abram's fineness modulus; relative standardization of sieves; physical, chemical, and microscopic analysis of sand.

Molding. See SAND, MOLDING.

Sand-Blasting. Sand Blast Sand, W. M. Weigel. U. S. Bur. Mines—Reports of Investigations, serial no. 2615, June 1924, 6 pp. Discusses applications in foundries and for cleaning, screen sizes used, shapes of grain, mining and preparation, etc.

Special Sands. Special Sands, W. M. Weigel. U. S. Dept. Mines—Reports of Investigations, no. 2646, Oct. 1924, 9 figs. Include filter, sandblast, engine, abrasive, fire or furnace, special flooring, roofing, and pottery placing sand, definitions and properties of which are given.

Vienna, Austria. Characteristics of Some Vienna Building Sands (Charakteristik einiger Wiener Bausande nach äusseren Kennzeichen), R. Grengg and K. Kammel. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 43-44, Oct. 31, 1924, pp. 369-373, 2 figs. Contains tables of data on sands, giving shape and size of grain, kind of rock, weight, and principal uses.

SAND BLAST

Air and Sand Conditions. Compressed Air and Sand Conditions in Sand Blasts (Die Pressluft- und Sandverhältnisse bei Sandstrahlgebläsen), H. R. Karg. Praktischer Maschinen-Konstrukteur, vol. 57, nos. 6, 7, and 9, Feb. 15, 25, and Mar. 15, 1924, pp. 45-49, 62-65, and 105-107, 6 figs. Suggestions for establishing reliable operating data for sand blasts; deals with volume and temperature conditions; air and sand consumption.

Sand for. See SAND, Sand-Blasting.

SAND, MOLDING

Bonding Substance of. The Bonding Substance of Molding Sands, H. P. Hanley. Am. Foundrymen's Assn.—Bul., vol. 3, no. 2, Apr. 1924, pp. 6-10. Its composition, properties, and tests.

Brass-Foundry, Reclaiming. Reclaiming Brass Foundry Sands, F. L. Wolf and A. A. Grubb. Metal Industry (N. Y.), vol. 22, no. 11, Nov. 1924, pp. 438-441, 5 figs. Molding-sand reclamation and control experiments.

Experimental Examination. The Experimental Examination of Moulding Sand, A. Touflieb. Foundry Trade Jl., vol. 30, no. 436, Dec. 25, 1924, pp. 548-549, 7 figs. Indicates simple and direct experimental examinations that can be carried out in any foundry, at same time giving definite and useful information on quality and suitability of various sands employed. (Abstract.) Translated from paper presented to Assn. Technique de Fonderie.

Grading, Grain-Size. The Grain Size Grading of Moulding Sand, H. C. Dews. Foundry Trade Jl., vol. 30, no. 430, Nov. 13, 1924, pp. 413-415, 4 figs. Discusses three common methods of grading sand according to its grain size: screening, elutriation, and sedimentation.

Heat Effect on Clay Content. Effect of Heat on Clay Content of Molding Sand Shown by Dye Adsorption Test, R. F. Harrington, W. L. MacComb and M. A. Hosmer. Brass World, vol. 20, no. 12, Dec. 1924, pp. 421-422, 3 figs. Results of tests on samples of three different gravels of same geological formation.

Reclamation Tests. Reports on Sand Reclamation Tests. Foundry, vol. 52, no. 12, June 15, 1924, pp. 470-471. (Abstract.) Progress report of committee of Am. Foundrymen's Assn.

Steel Castings. Moulding Sands for Steel Castings, A. Rhydderch. Foundry Trade Jl., vol. 29, nos. 406 and 407, May 29 and June 5, 1924, pp. 445-448 and 460-463, 6 figs. Refractoriness, naturally-bonded sand, examination of clay grades, stripping properties of sands, "compos," mechanical strength and permeability, controlling variables, standardization of testing methods, preparation, strength as affected by milling, drying of sands and compo molds, etc.

Testing. Notes on Sand Test Methods, C. W. H. Holmes. Foundry, vol. 52, nos. 10 and 11, May 15 and June 1, 1924, pp. 385-388 and 435-438, 1 fig. May 15: Discusses formation of sand and chemical, mineral, and mechanical properties most desired for molding purposes; nature of bond. June 1: Results obtained with sieve test and elutriator compared, with special reference to distribution of bond; selecting and standardizing tests. (Abstract.) Paper presented at Paris meeting of Int. Foundry Congress.

Report on Molding Sand Tests. Foundry, vol. 52, nos. 17 and 18, Sept. 1 and 15, 1924, pp. 675-680 and 713-716, 4 figs. Report of joint committee on molding sand research, Am. Foundrymen's Assn., giving tests for determining fineness and dye absorption properties, and methods for sampling shipments of sand. Sept. 15: Chemical analysis.

See also FOUNDRY EQUIPMENT, Core and Sand Testing Equipment.

SANITARY WARE

Manufacture, America. The Sanitary Ware Industry in America, LeRoy H. Minton. Ceramist, vol. 4, no. 6, Sept. 1924, pp. 336-350, 6 figs. Development; kinds of ware; statistics; recent developments and improvements; new types of kilns.

SANITATION

Engineering Problems. Present Status of Sanitary Engineering; Suggestions for Objects and Aims of the Sanitary Engineering Division, H. P. Eddy. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 1, Jan. 1924, pp. 3-18, 1 fig. Deals with problems of water supply and purification; sewerage; drainage, sewage disposal, and disposal of industrial wastes; refuse collection and disposal; air supply and purification; etc.

Relation to Health. Sanitation—Its Relation to Health and Life, Geo. C. Whipple. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 4, Apr. 1924, pp. 490-502, 1 fig. Notes on environmental complements to health; nuisances and annoyances; sanitation and its administration; present status of sanitary engineering.

SAWMILLS

Coal Mines. The Equipment and Upkeep of the Colliery Saw Mill, A. Powis Bale. Colliery Eng., vol. 1, nos. 8 and 9, Oct. and Nov. 1924, pp. 371-373 and 407-408, 12 figs. Oct.: Suitable component machines for inclusion in modern mill. Nov.: Plane saws; care of bearings; tests for oil and grease; belt vs. electric drive.

SAWS

Circular. Recent Investigations of Cold Circular Sawing Machines and Circular Saw Blades (Neuere Untersuchungen an Kaltkreissägemaschinen und Kreissägeblättern), A. Stotz. Maschinenbau, vol. 3, no. 12, Mar. 27, 1924, pp. 404-408, 14 figs. Results of investigations demonstrate superiority of rapid blades over tool-steel full blades, and also show that cold circular saws can compete successfully with ripping process by means of toothless friction saws.

Hot. Operation of High-Power Hot Saws (Die günstigste Arbeitsweise der Hochleistungs-Heisssägen), L. Roth. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 644-651, 10 figs. For cutting iron or steel bars coming from mill train; discusses main causes of appearance of cracks and explosion of disks, effect of Mn content, optimum tooth form, etc.

Mars Metal-Sawing Machine. The Mars Metal-Sawing Machine with Electric Feed ("Mars"-Metalltrennmaschine mit elektrischem Vorschub). Schiffbau, vol. 25, no. 10, Feb. 27, 1924, pp. 239-241, 4 figs. Describes machines made in Mars Works in Nuremburg-Doos for cutting off of steel and iron, with special reference to largest-size machine with electric feed used in shipyards.

SCALES

Computing. The Development of the Modern Computing Scale. Can. Machy., vol. 32, no. 11, Sept. 11, 1924, pp. 19-22, 4 figs. Brief outline of evolution of methods of weighing from shekels of silver of 1860 B. C. to products of Dayton Scale Works, Toronto, in 1924.

Locomotive. A Unique Locomotive Weighing Plant, C. C. Bailey. Baldwin Locomotives, vol. 2, no. 3, Jan. 1924, pp. 56-62, 7 figs. Comprises platform track scale of immense proportions, 24 individual wheel scales, concrete scale foundations of massive construction, and specially designed and well-equipped building which covers and protects scale and its mechanism.

SCHOOLS

Fireproof. See BUILDINGS, Schools.

Heating and Ventilating. See HEATING, ELECTRIC, Church and Schoolroom; HEATING AND VENTILATION, School Buildings.

Lighting. See LIGHTING, School Buildings.

SCIENTIFIC MANAGEMENT. See INDUSTRIAL MANAGEMENT.

SCLERON. See ALUMINUM ALLOYS, Scleron.

SCRAP

Briquetted Chips as. Using Briquetted Chips as Furnace Scrap. Iron Age, vol. 114, no. 24, Dec. 11, 1924, pp. 1537-1538, 4 figs. Compressed material turned out by machine of 6½ tons capacity per hr. at steel plant of Timken Roller Bearing Co., Canton, Ohio, method of gathering chips.

Chip-Handling Plant. What Becomes of the Chips?, C. J. Priebe. Am. Mach., vol. 60, no. 10, Mar. 6, 1924, pp. 361-363, 5 figs. Chip house at plant of LeBlond Machine Tool Co., Cincinnati; how chips are handled on production basis to facilitate shipment; plant for separating and filtering oil.

Electric Baling. Electric Scrap Baling. Blast Furnace & Steel Plant, vol. 12, no. 10, Oct. 1924, p. 450, 1 fig. New German method of simplifying production and meeting competition.

Railway, Reclamation of. See RAILWAY SHOPS, Scrap Reclamation.

Warship Hulls, Salvaging. Salvaging Hulls of Battleships, Chas. A. Barnes. Iron Trade Rev., vol. 74, no. 14, Apr. 3, 1924, pp. 932-934, 5 figs. About 10,000 tons of material heretofore lost in scrapping each ship now is reclaimed by method of cutting up hulls at navy yards; cost of work is comparatively low.

SCRAPERS

Wheel. The Economical Use of Wheel Scrapers, J. L. Harrison. Pub. Roads, vol. 5, no. 10, Dec. 1924, pp. 16-23, 6 figs. Significant differences between wheeler and fresno outfits; operating cost ratio, which is important factor in comparing fresno and wheeler operation, is affected by wages and size of outfit; effect of minor delays on output; how to schedule wheeler job.

SCREENS

Perforated Metalware Manufacture. Production of Perforated Metalware. Iron Age, vol. 113, no. 10, Mar. 6, 1924, pp. 701-705, 11 figs. Routing of materials and special punching arrangements features of Hendrick plant at Carbondale, Pa.; steel and manganese bronze principal materials.

Standardization. Standardization of Metal Fabrics (La standardisation des tissus métalliques), C. Ratel. Chimie & Industrie, vol. 12, no. 1, July 1924, pp. 16-30, 6 figs. Discusses various French, American, British, and German types of mesh for screening, and gives French equivalents for them; grinders and crushers, Rittinger law as basis for grinding diagrams, etc.

SCREW MACHINES

Automatic. National-Acme Five-Spindle Automatic. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 473-475, 4 figs. See also Machy. (Lond.), vol. 23, no. 597, Mar 6, 1924, pp. 752-754, 4 figs. Provision of five spindles instead of four permits distribution of cutting strains over larger number of tools, and as result, there is less tendency for strain to occur at points where heavy cuts are being taken. Among new features is exclusive use of right-hand tools, telescoping main tool carrier, improved type of spindle carrier, indexing mechanism for spindle carrier, stock feed in either first or fifth spindle, or both, centralized lubrication, etc.

Magazine Attachments. Design of Magazine Attachments, A. A. Dowd. Machy. (N. Y.), vol. 30, no. 10, June 1924, pp. 771-773, 4 figs. Problems of design; details of bar-stock magazine.

Tools. See TOOLS, Cross-Slide Facing.

SCREW THREADS

Comparators. The Wilson Projection Comparator for Screw Threads. Engineering, vol. 117, no. 3045, May 9, 1924, pp. 606-608, 6 figs. Devised for gaging screw threads and other similar solids of revolution.

Copper. Comparison Between Cold-Rolled and Cut Threads, Especially in Copper Screws (Vergleich zwischen kalt gerollten und geschnittenen Gewinden, besonders bei Kupferschrauben), M. v. Schwarz. Werkstattstechnik, vol. 18, no. 14, July 15, 1924, pp. 369-372, 10 figs. Discusses increased application of cold rolling instead of cutting, and its advantages in bending, not cutting, fiber; shown by micrographs.

Cutting. Threading Tool and Gage Forms for the New Screw Thread Standard, R. E. Flanders. Am. Mach., vol. 61, no. 13, Sept. 25, 1924, pp. 481-486, 15 figs. Consideration of important points in manufacture of threads conforming to new Am. (National) Screw Thread Standards. Shape of cutting edges for threading tools and taps; proper outlines for gage points; preparation of charts for inspection by optical projection; Hartness comparator.

Cutting Tools, Master, Manufacture of. Making Master Threading Tools, G. D. Hutchings. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 131-133, 7 figs. Formulas for use in making theoretically correct master tools for hobs or any similar thread-cutting tools.

Cutting Tools, Position of. Position of Thread-cutting Tool and Its Effect on Thread Form. Machy. (Lond.), vol. 24, no. 602, Apr. 10, 1924, pp. 54-55, 2 figs. Position of tool for external thread cutting; distortion produced in cutting internal threads; distortion of thread grooves having angular sides.

Dies. See DIES, Self-Opening; Screw-Cutting.

Measurement. Measuring Threads Accurately with Micrometers. Can. Machy., vol. 31, no. 18, May 1, 1924, pp. 31-32 and 51, 6 figs. Hints on accurate use of micrometers.

Rolling. Rolling Threads on Thin Brass Shells, W. P. Doolittle. Am. Mach., vol. 60, no. 22, May 29, 1924, pp. 793-794, 8 figs. Causes of troubles experienced in holding work to plug, or ring, thread gage, tools for thread rolling and beading.

Standards. American Standard Screw Threads. Am. Mach., vol. 61, nos. 10, 11, and 12, Sept. 4, 11, and 18, 1924, pp. 383-387, 421-422, and 457-460, 3 figs. Standardization and unification approved by Am. Eng. Standards Committee, May 1924, for bolts, machine screws, nuts and commercially tapped holes.

Fire-Hose Thread Standards. Iron Age, vol. 114, no. 16, Oct. 16, 1924, pp. 996-997. Characteristics of Nat. standard fire-hose coupling screw thread; limiting dimensions of threads and gages specified.

Stud Fitting. Modern Practice in Fitting Studs. Am. Mach., vol. 60, no. 9, Feb. 28, 1924, pp. 323-324. Résumé of methods used in securing satisfactory fits for studs in aluminum, bronze, cast iron, and steel.

Taps. See TAPS.

Worm. The Gauging of Finish-ground Worms by Cylinders, H. E. Merritt. Engineer, vol. 138, no. 3580, Aug. 8, 1924, pp. 162-163, 3 figs. Shows that from certain fundamental worm dimensions size and position of a cylinder to gage any point on thread contour may be calculated, and in spite of apparent difficulty of problem, solution is very simple and easy of application.

SCREWS

Lead-Screw, Chasing. Chasing-Lead-screws, Chas. O. Herb. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 883-884, 2 figs. Practice of Am. Tool Works Co.

Threads. See SCREW THREADS.

Whitworth. Whitworth Screws, M. H. Sabine. Machy. (Lond.), vol. 24, no. 618, July 31, 1924, pp. 562-565, 1 fig. Details of dimensions, efficiency, and other data in tabular form.

Wood. Production Data in Manufacturing Wood Screws, W. Richards. Can. Machy., vol. 31, no. 27, July 3, 1924, pp. 25 and 43, 3 figs. Description of manufacture of steel wood screws and production data for every operation. All operations performed automatically. Machines of each class arranged in batteries to facilitate work.

SEAPLANES

All-Metal. Large All-Metal Seaplanes, Rohrbach. Roy. Aeronautical Soc.—Jl., vol. 28, no. 168, Dec. 1924, pp. 655-672, and (discussion) 672-675, 18 figs. Author gives his personal experience and opinions; general advantages of all-metal construction; advantage of heavily loaded airplane; comparison of biplane and monoplane; details of Ro II-type flying boat being built in Copenhagen.

Developments and Aims. The World Status of Seaplanes (L'Orientation actuelle de l'Hydraviation mondiale), Boutiron. Aéronautique, vol. 5, no. 55, Dec. 1924, pp. 517-525, 9 figs. Discusses tendencies and aims; evolution of shape and outline; increasing tonange; metallic construction; improvement of hull and fuselage; future province of marine planes.

Metal. The L.F.G.-V20a Commercial Airplane (Das Verkehrsflugzeug "L.F.G.-V20a), R. Roseph. Motorwagen, vol. 27, no. 13, May 10, 1924, pp. 223-224, 3 figs. Improved type of metal seaplane with empty weight of 1150 kg.

Navy Types. Navy Types of Heavier-than-Air Craft, E. E. Wilson. U. S. Nav. Inst.—Proc., vol. 50, no. 262, Dec. 1924, pp. 2029-2040, 9 figs. Classification of different types, pointing out means by which they may be readily recognized at distance.

PN-7 Boat. The PN-7 Boat Seaplane, E. E. Wilson. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 3, Aug. 1924, pp. 351-376, 13 figs. Twin-motored boat seaplane having gross load of 14,800 lb., max. speed of 105 m.p.h., and ceiling of 8000 ft.; propelling machinery consists of Wright T-2 engines rated at 525 hp. at 1800 r.p.m.

Static Stability. Static Stability of Seaplane Floats and Hulls, W. S. Diehl. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 183, Mar. 1924, 13 pp., 3 figs. Lateral stability—twin floats; longitudinal stability—single and twin floats; lateral stability—single float and boat-type seaplanes; application to design.

SEARCHLIGHTS

Diffusion of Beam. See LIGHT, Diffusion.

High-Intensity. See ELECTRIC ARC, High-Intensity.

Towers, Disappearing. Army Engineers Build Disappearing Searchlight Towers, E. D. Cummings. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 227-229, 3 figs. Supported on trunnion shafts; carefully balanced for quick operation; towers 45 ft. to 100 ft. high.

SEISMOPHYSICS. See EARTH, Interior of.

SELENIUM

Conductance of. Change of Conductance of Selenium Due to Electronic Bombardment, R. de L. Kronig. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 377-382, 4 figs. Results of experiments in which a low-resistance selenium cell about 1 in. square made by pressing Se between 20 double turns of fine Pt wire, was mounted in a vacuum tube with a grid and an oxide-coated, equipotential, electrically-heated cathode and subjected to bombardment by electron currents up to 400μ-amp. at potentials up to 95 volts.

Densimeter. The Selenium Optical Densimeter for Colorimetric Work, E. V. Hjort, A. Lowy and O. Blackwood. Optical Soc. America & Rev. Sci. Instruments—Jl., vol. 9, no. 1, July, 1924, pp. 43-51, 9 figs. Detail of new apparatus for measuring absorption of red, and to less degree of orange light, and its practical application to solutions of salts of copper and nickel.

SEMI-DIESEL ENGINES

Deutz Marine. The Deutz Marine Semi-Diesel Engine (Der Deutzer Schiffs-Semi-Dieselmotor). Motorwagen, vol. 27, no. 23, Aug. 20, 1924, pp. 408-411, 8 figs. Details of compressorless Diesel, its increased efficiency, smallest fuel consumption being 166 g. per hp-hr. at 320 effective hp.

Operation. Semi-Diesel Operation at All Load Ratings, H. F. Shepherd. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 366-368, 3 figs. Discusses variable operating characteristics through load range and gives scavenging as most important factor in this variation. Calculations for a two-stroke engine with compression of 180 lb. gage.

SEMI-STEEL

Castings. The Making of Semi-Steel Castings, G. W. Gilderman. Foundry Trade Jl., vol. 30, no. 413, July 17, 1924, pp. 44-45. Discusses mixtures and charging, preparation of mold, pattern proportion, and alloys.

Characteristics. Semi-Steel. Metal Industry (Lond.), vol. 25, no. 18, Oct. 24, 1924, pp. 403-405. Points out that semi-steel is nothing more than a good cast iron; influence of steel on grain structure; advantages of semi-steel and difficulties of its manufacture; cost considerations; "sluggishness" and risk of imhomogeneity; hematite semi-steel mixtures and influence of phosphorous; influence of sulphur.

Manufacture. Semi-Steel, A. Campion. Foundry Trade Jl., vol. 29, no. 400, Apr. 17, 1924, pp. 316-318. Methods of manufacture, raw materials to be used, charging conditions, fluxing, etc.

SEPARATORS

Ash and Fuel. A New Fuel-Recovery Plant (Ash Washer) [Ein neuer Brennstoffrückgewinner (Schlackenwäscher)] H. Kiesel. Gas- u. Wasserfach, vol. 67, no. 12, Mar. 22, 1924, pp. 153-154, 2 figs. New type of ash separator, known as eukonomator, employed at gas works in Heilbronn, Germany, which has not heretofore been described. See description in English in Eng. Progress, vol. 5, no. 12, Dec. 1924, p. 266, 1 fig.

Recovering Fuel from Ashes, S. H. Bunnell. Iron Age, vol. 113, no. 19, May 8, 1924, p. 1368, 2 figs. Operation of Columbus coke separator, developed by Benno Schilde Machy. Co., Germany, and marketed by Ash Reclaiming Machy. Co. of New York.

Coal. See COAL, Dry Cleaning.

Magnetic. Magnetic Protection and Separation, E. A. Wilcox. Jl. Electricity, vol. 53, no. 9, Nov. 1, 1924, pp. 326-329, 2 figs. Deals with four general classifications of magnetic separators.

Magnetic Separator (Magnetscheider zum Aussondern von Eisen). Glasers Annalen, vol. 94, no. 10, May 15, 1924, pp. 130-133, 14 figs. Describes a magnetic separator in shape of a drum, which extracts magnetic impurities from any pulverized mixture.

New Magnetic Separators (Neue Magnetscheider für schwachmagnetische Erze, Kohle und Kali). Bergbau, vol. 37, no. 5, Mar. 5, 1924, pp. 65-66, 3 figs. By use of very strong and highly concentrated magnetic field it is possible to separate ores of low permeability or to segregate materials which differ only slightly in magnetic permeability; for finely divided material, up to 8 mm. diam., separator comprising shaking trough, with magnets and rotating disk beneath, deals with up to 1760 lb. of ore per hr.; larger material should be treated in drum-type separator; from 1 to 2 tons of ore can then be treated per hr. using two magnets, and from 3 to 4 tons using four magnets.

Tests with Davis Magnetic Ore Separators (Några försök med Davis' magnetiska separator), S. Schwartz. Jernkontorets Annaler, vol. 108, no. 10, 1924, pp. 534-549, 8 figs. Description of design of separator and comparative results obtained on a small Davis separator and on two and three drum-type separators. Davis separator appears superior for fine grain material; less so for coarser grains.

Oil. See LUBRICATING OILS, Purifier for.

Steam. See LOCOMOTIVES, Steam Separators.

SEWAGE

Activated Sludge as Fertilizer. See FERTILIZERS, Sewage Sludge as.

Analysis of. Sewage Works Analyses, C. B. O. Jones. Surveyor & Mun. & County Engr., vol. 65, no. 1684, Apr. 25, 1924, pp. 403-405. See also Can. Engr., vol. 47, no. 12, Sept. 16, 1924, pp. 337-339. Methods used in analyses of sewages and sewage effluents; need for greater accuracy.

Disposal. See SEWAGE DISPOSAL.

Irrigation. See IRRIGATION, Sewage.

Sludge as Fuel. See FUELS, Sewage Sludge.

Trade Wastes, Inflammable Liquids Separation from. Devices for Separating Inflammable and Explosive Liquids from Effluents (Einrichtungen zur Abscheidung von feuergefährlichen, explosiven Flüssigkeiten aus Abwässern), Hartleb. Gesundheits-Ingenieur, vol. 47, no. 45, Nov. 8, 1924, pp. 525-528, 7 figs. Describes apparatus for freeing effluent waters from benzine, petroleum, benzol, and other inflammable liquids to prevent accidents.

SEWAGE DISPOSAL

Activated Sludge. Dewatering Activated Sludge, L. Pearse. Public Works, vol. 55, no. 8, Aug. 1924, pp. 262-265. See also Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 91-94, and Can. Engr., vol. 47, no. 7, Aug. 12, 1924, pp. 240-242. Apparatus and methods employed in United States and results obtained in operating and test plants. Difficulties of dewatering are chiefly due to physical condition of solids which retain very tenaciously water to large volume of sludge to be handled and to importance of removing practically all solids from sludge. Processes involved in primary and secondary removal of water. Abstract of paper read before Int. Conference on Sanitary Eng., London.

Elasticity of the Activated Sludge Process, J. Bolton. Surveyor & Mun. & County Engr., vol. 66, no. 1697, July 25, 1924, pp. 85-86. Experience gained from unavoidable stoppage of power to 50,000-gal. unit shows that process is very elastic.

Elasticity of Activated Sludge Process, J. Bolton. Can. Engr., vol. 47, no. 12 Sept. 23, 1924, pp. 355-356. See also Mun. & County Eng., vol. 67, no. 3, Sept. 1924, pp. 146-148. Results of experiments at a plant at Bury, Eng., to show effect on sludge after various periods of rest. From paper presented at Int. Conference of Sanitary Eng., Lond.

Experience in Dewatering Activated Sludge, L. Pearse. Mun. & County Eng., vol. 67, no. 1, July 1924, pp. 18-21. Discusses difficulties of dewatering, properly conditioning of sludge, comparison of press types, filtering, filtering with aid of additional pressure, vacuum filters, centrifuge, flotation, secondary removal of water, filter cloths and cost data.

Fertilizing Value of Activated Sludge, V. H. Kadish. Can. Engr., vol. 47, no. 11, Sept. 9, 1924, pp. 313-314. See also Eng. & Contracting (Water Works), vol. 62, no. 4, Oct. 8, 1924, pp. 817-820. Discusses investigations at Milwaukee, Wis.; sulphuric acid employed for chemical conditioning; successful experiments with sludge on truck farms and golf courses.

Four Activated-Sludge Plants in California, C. E. Grunsky, Jr., Eng. News-Rec., vol. 92, no. 22, May 29, 1924, pp. 937-939, 1 fig. Various systems of air distribution used include perforated pipes and Trent aerator on Barker-mill principle.

Milwaukee's Sewage Disposal Plant. Public Wks., vol. 55, no. 1, Jan. 1924, pp. 17-20, 2 figs. Detailed description of activated sludge plant under construction; will have two low-level and two high-level siphons, maximum capacity of the four siphons being 317,000,000 gal. daily.

Study of Activated Sludge (Contribution à l'étude des boues activées), L. Cavel. Académie des Sciences—Comptes Rendus, vol. 179, no. 20, Nov. 17, 1924, pp. 1095-1098. Concludes that presence of even traces of acid prevent nitrification and even very weakly-acid sewage should not be allowed in sludge purifying plants.

Tests of Air Pressure Losses in Activated-Sludge Plants, R. J. Bushee and S. L. Jack. Eng. News-Rec., vol. 93, no. 21, Nov. 20, 1924, pp. 823-824, 4 figs. Observations on cast-iron pipe, venturi air meters, check valve and three different makes of aeration plates.

The Filtration of Activated Sludge, F. W. Mohlman. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 225-227. Practical, simple method of treatment of activated sludge before filtration in use at plants and testing stations of Sanitary District of Chicago; procedure in use at each plant is discussed separately.

Chicago. The Sewage Disposal Problem of Chicago, L. Pearse. Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 74-76. Discusses sewage treatment in Chicago. Review of developments and projects under way.

Development. Historical Development of Sewage Purification Processes, J. H. Garner. Surveyor & Mun. & County Engr., vol. 66, no. 1704, Sept. 12, 1924, pp. 213-216. Discusses land irrigation, intermittent filtration, artificial filters, rise of biological methods, contact beds, percolating filters, humus tanks, septic tank, travis hydrolytic tank, Imhoff tank and recent developments.

Direct Oxidation. Direct Oxidation Tests at Toronto, F. A. Dallyn, G. A. Johnson and A. V. Delaporte. Can. Engr., vol. 46, no. 8, Feb. 19, 1924, pp. 243-254, 6 figs. Carried out under direction of Provincial Board of Health of Ontario at Experimental Station, Toronto; description of plant and method of conducting tests; conclusions based on experiments.

Distributors, Power-Driven Sewage. Distributors for Percolating Sewage Purification Beds. Engineer, vol. 137, no. 3556, Feb. 22, 1924, pp. 206-208, 6 figs. Describes latest type of power-driven sewage distributors supplied by Hartley, Sons & Co. for new disposal works at Leeds.

Dosing Device for Filter Bed. Rotating Dosing Device for Sewage Filter Bed. Eng. News-Rec., vol. 92, no. 12, Mar. 20, 1924, pp. 496-497, 2 figs. Ship's propeller supplies driving force for mech-

anism set to operate on time rather than quantity basis.

Ejector System. Ejector System for Sewage Disposal, J. J. Taylor. Compressed Air Mag., vol. 29, no. 2, Feb. 1924, pp. 782-786, 5 figs. Advantages of pumping by compressed air in this manner; design and operation.

Emscher Tanks. Methane from Clarification Plants and Their Carbonic Acid Content (Sumpfgase aus Kläranlagen und deren Kohlensäuregehalt), G. Strassburger and M. Decker. Gesundheits-Ingenieur, vol. 47, no. 34, Aug. 23, 1924, pp. 369-370. Discusses experience at Erfurt with Emscher wells and Erfurt "funnels," and gives table of figures for CO_2 in methane gas, and shows advantages of Erfurt "funnels."

Experiment Station, N. J. Report to the Sanitary Engineering Division, Relative to the New Jersey State Sewage Experiment Station. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 255-258.

Fertilizer. See FERTILIZERS, Activated Sludge as.

Great Britain, 1923. Sanitary Engineering in 1923. Engineer, vol. 137, no. 3549, Jan. 4, 1924, pp. 10-11. London main drainage and sewage disposal; sewage treatment by agitation and aeration; Walshaw system of disposal; Manchester's new activated sludge plant; Leeds disposal works; works in hand and in contemplation.

Imhoff Tanks. Imhoff Tanks—Reasons for Differences in Behavior, H. P. Eddy. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 5, May 1924, pp. 616-645, and (discussion) 706-723, 14 figs. Investigation to ascertain reasons for differences in operating results obtained from Imhoff tanks, in order that requirements for satisfactory results might be better understood. See (discussion) in vol. 50, nos. 6, 7, and 9, Aug., Sept., and Nov. 1924, pp. 901-924, 1132-1136, and 1500-1510 11 figs.

New Design for Collecting Methane Gas from Imhoff Tanks, K. Imhoff. Eng. News-Rec., vol. 93, no. 15, Oct. 9, 1924, p. 585, 1 fig. How construction of early gas collectors used in two-story sewage sedimentation tanks in Ruhr District, in Germany, which were constructed so that scum could be removed, has been improved so that manual labor is no longer necessary. Translated from German.

Operation of Imhoff Sewage Tanks, E. L. Waterman. Can. Engr., vol. 46, no. 26, June 24, 1924, pp. 655-657. See also Am. City Mag., vol. 30, no. 3, Mar. 1924, pp. 256-260, 7 figs., and Mun. & County Eng., vol. 67, no. 2, Aug. 1924, pp. 101-104. Essential features of tank; utilization of gas; careful and systematic operation necessary to obtain satisfactory results; cleaning screens and grit chambers, cleaning sides and bottom of settling chamber, removing floating material from sedimentation chamber, treatment of scum on gas-vent chamber, observing depth of sludge, etc.

Industrial Wastes. Disposal of Industrial Wastes in U. S., H. P. Eddy. Can. Engr., vol. 47, no. 15, Oct. 7, 1924, pp. 395-397. Effect of animal, vegetable, and mineral wastes and methods of treatment commonly used. From paper presented at Int. Conference on Sanitary Eng.. Lond.

Experimental Work on the Purification of Trade Waste Waters, H. Kessener. Surveyor & Mun. & County Engr., vol. 66, no. 1705, Sept. 19, 1924, pp. 233-234. See also Eng. & Contracting (Water Works), vol. 62, no. 5, Nov. 12, 1924, pp. 1067-1070. Notes on experiments carried out in Holland in connection with dairy, sugar-factory, strawboard, and potato-flour wastes. Extracts from paper presented at Int. Conference on Sanitary Eng., Lond.

Lime in the Treatment of Trade Wastes, R. H. Ferguson. Chem. Age (N. Y.), vol. 32, no. 7, July 1924, pp. 301-304. See also Mun. & County Eng., vol. 67, no. 5, Nov. 1924, pp. 256-260. Discusses use of lime as precipitating and coagulating agent, as neutralizing agent for acid wastes, as agent to better physical condition of sludge, as alkali to give optimum pH, etc. Abstract of paper read before Nat. Lime Assn.

Treating Industrial Wastes, F. Bachmann and E. B. Besselievre. Chem. & Met. Eng., vol. 31, no. 10, Sept. 8, 1924, pp. 386-387. Treatment so that wastes are no longer injurious is becoming a legal necessity in most states. Describes one method of treatment. From paper read before Am. Inst. Chem. Engrs.

Plants. New Sewage Works at Tilbury. Engineer, vol. 138, no. 3583, Aug. 29, 1924, pp. 242-245, 8 figs. Description of new sewage disposal works of Thurrock, Grays and Tilbury Joint Sewerage Board, and difficulties which were encountered and overcome in carying out undertaking.

Operating Results of Baltimore Sewage-Works, 1919-22, C. E. Keefer. Eng. News-Rec., vol. 92, no. 6, Feb. 7, 1924, pp. 250-251, 17 figs. Graphical presentation on probability paper of range and frequency of chemical and bacterial data obtained.

Sewage Disposal at Hawick. Surveyor & Mun. & County Engr., vol. 65, no. 1692, June 20, 1924, pp. 571-573, 3 figs. Particulars of newly-constructed treatment works in Scotland. Designed to deal ultimately with a dry-weather flow of 3,000,000 gal. per day of average strength sewage, consisting largely of effluents from textile industries.

Sewage Disposal Works at Stratford, Ont., A. B. Manson. Can. Engr., vol. 46, no. 12, Mar. 18, 1924, pp. 335-336, 4 figs. Existing Imhoff tank system converted into an activated sludge plant to serve population of 18,000; nearly 2,000,000 gal. sewage per day handled; new feature embodied in construction of plant.

The Sewage Treatment Plants of Rochester, New York, J. F. Skinner. Am. City, vol. 30, no. 1, Jan. 1924, pp. 37-41, 3 figs. Details of each of three sewage-treatment plants serving city.

The Urbana-Champaign Sewage Treatment Plant, A. L. Tholin. Technograph, vol. 36, no. 11, Jan. 1924, pp. 71-73 and 101, 3 figs. Process consists of coarse screen, Imhoff tanks, sludge drying beds, sprinkling filters and secondary tanks; describes design and construction of plant.

Pumping Stations. The Design and Operation of Sewage Pumping-Stations, C. S. Timanus. Am. City Mag., vol. 30, no. 4, Apr. 1924, pp. 390-393, 1 fig. Capacities determination, selection of equipment, sewage ejectors, etc.

The New Sewage Pumping Station at Lincoln. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 546-548, 3 figs. Details of pumping machinery and storm-water pumps.

See also PUMPING STATIONS, Baltimore, Md.

Romford, England. The Riverside Sewerage Scheme of the Romford R. D. C. Engineer, vol. 138, no. 3585, Sept. 12, 1924, pp. 290-292, 9 figs. partly on p. 296. Discusses extension of sewer lines under authority of Romford District Council, and gives details of construction of new Riverside sewage works and new Eastern sewage works.

Sedimentation and Coagulating Basins. New Sedimentation and Coagulating Basins at Toledo, Geo. N. Schoonmaker. Eng. News-Rec., vol. 92, no. 11, Mar. 13, 1924, pp. 443-446, 6 figs. Experience with old basins utilized in design of new structure; non-baffled units with controlled supply.

Sheffield, England. Sewage Disposal in Sheffield, J. Haworth. Surveyor & Mun. & County Engr., vol. 16, no. 1694, July 4, 1924, pp. 15-16. Details of operation of sewage treatment plant of Tinsley district, including Bio-Aeration plant, its general layout and extension. Abstract of paper read before Instn. Municipal & County Engrs.

Sludge Digestion. Advantages of Separate Sludge Digestion, W. D. Vosbury. Contract Rec., vol. 38, no. 29, July 16, 1924, pp. 719-720, and Public Works, vol. 55, no. 6, June 1924, pp. 184-185. Compares relative merits of two processes of sludge digestion; gives some objectionable features inherent with tanks combining both sedimentation and sludge digestion; successful operation of separate system.

Separate Sludge-Digestion Sewage Plant, L. R. Howson and H. P. Letton. Eng. News-Rec., vol. 92, no. 15, Apr. 10, 1924, pp. 602-607, 9 figs. Single-story tanks at Lincoln, Neb., precede sprinkling filters in plant for sanitary district; muck bottom covered with concrete "raft"; high pump efficiencies.

Sludge Disposal by Digestion Process, J. Watson. Can. Engr., vol. 46, no. 19, May 6, 1924, pp. 499-501. See also Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 85-87. Slow progress in sludge digestion processes; principal features of Travis hydrolytic and Imhoff tanks; development of hydrolytic tank at Birmingham.

Studies of Separate Sludge Digestion at Baltimore, T. C. Schaetzle. Eng. News-Rec., vol. 93, no. 23, Dec. 4, 1924, pp. 919-923, 5 figs. Three years' investigation at sewage works shows most rapid digestion in first few weeks; one-third seeding sludge and liquefaction by aerobes desirable features.

Sludge Disposal. Developments in Sludge Disposal, J. Haworth. Can. Engr., vol. 46, no. 18, Apr. 29, 1924, pp. 481-482. Difficulties of problem are nearer an economical solution; drying sludge on ash beds, gauze bands and with centrifuges.

Removal and Disposal of Air-Dried Sludge at Baltimore, J. H. Gregory and C. E. Keefer. Eng. News-Rec., vol. 93, no. 1, July 3, 1924, pp. 13-16, 3 figs. Settling tank sludge goes to separate digestion tanks, thence to drying beds, after which much of it is loaded on farmers' wagons free of charge.

Stream Pollution. See STREAM POLLUTION.

Treatment. Modern Sewage Treatment in the Sanitary District of Chicago, F. W. Mohlman. Armour Engr., vol. 16, no. 1, Nov. 1924, pp. 9-12 and 29-30, 3 figs. Treatment works; Imhoff tanks; sprinkling filters; activated sludge; sampling and analyses; control of operation; special problems; volume of air required for activation.

Some New Sewage Treatment Plant and Apparatus. Engineer, vol. 138, no. 3600, Dec. 26, 1924, pp. 731-732, 6 figs. partly on p. 726. Describes bio-aeration and two types of water-wheel-driven sewage distributors at Hanley sewage works, Stoke-on-Trent.

The Part Which Bio-Aeration May Yet Play in Purifying Sewage, J. D. Watson. Engineering, vol. 118, no. 3060, Aug. 15, 1924, pp. 241-242. Critical review of activated sludge and bio-aeration processes as applied by various English municipalities.

See also Activated Sludge, Chicago; Development; Emscher Tanks; Imhoff Tank; Industrial Wastes; Sheffield; Sludge Digestion.

Trickling-Filter Distributors. Trickling Filter Distributors at British Sewage-Works, T. Chalkley Hatton. Eng. News-Rec., vol. 93, no. 16, Oct. 16, 1924, pp. 624-626, 4 figs. Notes taken recently at sewage works of Birmingham, Bradford, and Leeds show that traveling distributors rather than fixed nozzles are main reliance.

Works, Power Plant. See STEAM POWER PLANTS, Sewage-Disposal Works.

SEWER CONSTRUCTION

Detroit, Mich. The Detroit Sewage Program. Excavating Engr., vol. 17, no. 12, Dec. 1923, and vol. 18, nos. 2 and 3, Feb. and Mar. 1924, pp. 409-412, 55-57, and 94-96, 21 figs. Describes construction methods and equipment used in connection with program for sewage improvement in Detroit; work done almost entirely by dragline excavators.

Trench Width and Pipe Load. Relation of Sewer Trench Width to Load on Pipe, Geo. C. D. Lenth. Eng. News-Rec., vol. 92, no. 13, Mar. 27, 1924, pp. 533-535, 14 figs. Wide trenches and poor bedding give high loading; definite figures for each condition make rational designs possible.

Winnipeg. Construction of Renfrew Street Sewer, W. Aldridge. Can. Engr., vol. 46, no. 25, June 17, 1924, pp. 626-627, 2 figs. Large main sewer, 72 in. diameter, constructed in Winnipeg to relieve unemployment in winter; construction carried out in zero weather; Ferguson segment vitrified clay block chosen for sewer; is not affected by alkali ground water.

SEWERAGE

Storm-Water Drainage. See DRAINAGE, City Areas, Storm-Water Discharge.

SEWERS

Backwater. See CONDUITS, Backwater and Drop-Down Curves.

Calculation. Dimensioning of Municipal Canalization (Die Dimensionierung städtischer Kanäle), E. Melli. Schweizerische Bauzeitung, vol. 84, no. 12, Sept. 20, 1924, pp. 137-141, 5 figs. Determination of rain precipitation and run-off; formulation of coefficient of run-off; comparison of high water formulas in use.

Tables for Most Suitable Form and Static Calculation of Structures (Zahlentafeln zur günstigsten Formgebung und statischen Berechnung von nach der Stützlinie geformten Bauwerken), F. Bülow. Gesundheits-Ingenieur, vol. 47, no. 23, June 7, 1924, pp. 221-224, 3 figs. Develops formulas and tables for obtaining quickly reliable data for most suitable shapes of profiles of water conduits for various loads.

Concrete. Making the Concrete Pipe for Los Angeles Outfall Sewer. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 296-298, 5 figs. Outfall will extend 5400 ft. into ocean and will consist of a reinforced-concrete pipe 7 ft. in diameter inside, which is being made in sections in a casting yard nearby; sections are 12 ft. 3 in. long and weigh 18 tons each. Describes design and manufacture of pipe.

Construction. See SEWER CONSTRUCTION.

Flow of Water in. A Comparative Test of the Flow of Water in 8-Inch Concrete and Vitrified Clay Sewer Pipe, E. R. Wilcox. Univ. Wash., Eng. Experiment Station—Bul., no. 27, Mar. 1, 1924, 42 pp. 30, figs. Methods used for and results of tests made on slopes from 0.005 to 0.004, and description of apparatus.

Hamilton, Canada. Homeside District Sewers, Hamilton, Ont., H. S. Philips and W. M. Johnston. Can. Engr., vol. 46, no. 18, Apr. 29, 1924, pp. 468-472, 14 figs. Description of sewerage system just completed and construction methods employed; storm water run-off coefficient studies; trunk system of sewers comprises five sections; reinforced-concrete and vitrified pipe employed; details of costs for different types of construction.

Los Angeles, Cal. Outfall Sewer Project of

Los Angeles, W. A. Scott. Eng. Wld., vol. 24, no. 3, Mar. 1924, pp. 139-142, 6 figs. Describes project comprising 87,236 lin. ft. of trunk sewer extending from southwestern part of city to treatment plant on ocean beach, and 5711 ft. of outfall pipe running from plant out into sea, giving construction data; description of sewage treatment plant.

Progress on North Outfall Sewer for City of Los Angeles, W. T. Knowlton. Eng. News- Rec., vol. 92, no. 17, Apr. 24, 1924, pp. 730-731, 3 figs. Work done under several contracts; largest pipe, 102 in. in diam.

Pipe for, Manufacture. Manufacturing Sewer Pipe, E. F. Clemens. Brick & Clay Rec., vol. 65, nos. 8, 9, 10, and 11, Oct. 14, 28, Nov. 11, and 25, 1924, pp. 530-532, 607-609, 688-689 and 692, 762-763, 10 figs. Oct. 14: Mining of raw material. Oct. 28: Advance press scheduling and drying problems. Nov. 11: Burners and burning. Nov. 25: Kilns and kiln construction.

Relief. The Design of Relief Sewers, A. W. Consoer. Mun. & County Eng., vol. 66, no. 2, Feb. 1924, pp. 89-90. Paper read at Ill. Soc. of Engrs. annual meeting.

Repairing. Sewer Repairing in Dayton, I. E. Houk. Pub. Wks., vol. 55, no. 3, Mar. 1924, pp. 87-89, 2 figs. Old brick sewers in unsafe condition repaired by lining invert with vitrified brick and reinforcing arch with gunite, with or without steel reinforcement.

Run-Off Coefficient. The Coefficient of Run-Off in Storm Sewer Design, Le Roy K. Sherman. Mun. & County Eng., vol. 66, no. 6, June 1924, pp. 297-301, 3 figs. Describes procedure for determining percentage "C" of rainfall run-off for sewered areas by rational method.

Velocity of Flow. On the Velocity of Flow in Sewers Partly Full, M. T. M. Ormsby. Surveyor & Min. & County Engr., vol. 65, no. 1679, Mar. 21, 1924, pp. 297-298, 1 fig. Gives diagram for finding velocity of flow in sewers when discharge is very much less than full capacity of sewer; intended to be read along with a table of usual form, giving discharge and velocity in a given sewer at a given gradient when flowing full. Curve is drawn for both circular and egg-shaped sewers, for comparison.

SEWING MACHINES

Manufacture. Dies for Producing a Complicated Sewing-Machine Part. Machy. (Lond.), vol. 24, no. 616, July 17, 1924, pp. 493-496, 6 figs. Details of design and work of dies for piercing and blanking, second forming operation, and final forming operation.

SHAFT SINKING

Air Compressors for. See AIR COMPRESSORS, Portable.

Cementation. Cemention of a Pit Shaft, M. B. Gardner. Iron & Coal Trades Rev., vol. 109, no. 2962, Dec. 5, 1924, p. 927, 1 fig. Relates to treatment of two shafts sunk about 50 years ago, and treated in latter part of 1917.

Cementation Process in a Nottinghamshire Sinking. Colliery Engr., vol. 1, no. 6, Aug. 1924, pp. 270-282, 19 figs. Describes and illustrates equipment and sinking operations in heavily watered strata undertaken at Ollerton by Butterley Co., Ltd.

Coal Mines. Sinking Shafts for Coal Mines. Can. Engr., vol. 47, no. 3, July 15, 1924, p. 163. Advantages of Francois cementation process for sinking shafts through water bearing ground; application of liquid cement.

Compressed-Air. Compressed Air Work in Mining and Iron Works (Ueber Anwendungen von Druckluftgründungen im Bergwerks- und Hüttenbetriebe), H. Butzer. Bautechnik, vol. 2, no. 47, Oct. 31, 1924, pp. 531-534, 7 figs. Compressed air application in concrete shaft construction; compressed air concrete work in construction of shafts for mine ventilation, and hydraulic mining, for foundations of electrode presses, and for well construction.

Freezing Process. Forty Years of Freezing Process in Shaft Sinking (40 Jahre Gefrierverfahren beim Schachtabteufen). Bergbau, vol. 37, nos. 23, 25, and 26, Oct. 23, Nov. 6 and 13, 1924, pp. 613-616, 658-661, and 678-680. Discusses preparatory work, borings, plumbing, brine and other pipe lines, refrigerating plant; freezing process, etc.

Freezing Process Enables Lessees to Sink Shafts in Deep Marsh Land of North Belgium, M. Biquet. Coal Age, vol. 25, no. 23, June 5, 1924, pp. 831-834, 3 figs. Describes sinking of two shafts by refrigeration nearly a mile deep; 46 beds aggregating over 100 ft. of coal made almost unapproachable by bogs thousands of feet deep; shafts sunk with protecting ice wall.

Shaft Sinking by the Freezing Process, D. Adam. Colliery Eng., vol. 1, no. 9, Nov. 1924, pp. 409-420 and 424, 30 figs. Illustrated account of shaft sinking in Belgian Campine with detailed description of telelinograph method of surveying freezing boreholes.

The Development of Shaft Sinking according to the Freezing Process in the Past Twenty Years (Die Entwicklung des Schachtabteufens nach dem Gefrierverfahren in den letzten zwanzig Jahren), Erlinghagen. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 16, Apr. 19, 1924, pp. 383-393, 16 figs. Application of freezing process in its early development; detailed description of process and its development.

Petrification Process. Shaft Sinking Through Quicksand by Means of a New Petrification Process (Schachtabteufen durch Schwimmsandschichten mit Hilfe eines neuen Versteinungsverfahrens), W. Gross. Glückauf, vol. 60, no. 27, July 5, 1924, pp. 559-561, 4 figs. See also Colliery Guardian, vol. 128, no. 3320, Aug. 15, 1924, pp. 414-415, 3 figs. Describes Sonnenschein process of making cavities in quicksand and filling them with cement to enable driving of shafts.

SHAFTING. See POWER TRANSMISSION, Shafting and Shaft Hangers; SHAFT.

SHAFTS

Collared, Forging. See FORGING, Collared Shafts.

Couplings for. See COUPLINGS, Shaft.

Flexible. Experimental Research on Flexible Shafting for Transmission (Ricerche sperimentali sugli alberi flessibili da trasmissione), A. Alpe. Industria, vol. 38, no. 10, May 31, 1924, pp. 269-274, 8 figs. Results of experiments; application of flexible shafting in operation of grinding wheels, dynamos, etc.

Mine. See MINE SHAFTS.

Stiffness. See AUTOMOBILES, Shafts, Stiffness of.

Torsional Strength. Torsional Strength of Keyway-cut Shafts, W. R. Needham. Machy. (Lond.), vol. 23, no. 596, Feb. 28, 1924, pp. 705-706, 2 figs. Discusses method of calculating polar moduli; includes table of torsional strength (polar values) of British standard sunk keyway shafts.

Torsional Stress Calculation. See BOLTS, Tension Calculation.

Vibrations. Bending Vibrations of Rotating Shafts (Biegungsschwingungen umlaufender Wellen), M. Ulrici. Dinglers Polytechnisches Jl., vol. 339, nos. 10 and 11, May and June 1924, pp. 89-92 and 99-102. Discusses behavior of shafts at critical speeds, balancing of shafts, cal-

culation of bending vibrations for shafts supported at either end, etc.

Whipping of. See ELECTRICAL MACHINERY, Shaft Whipping.

Whirling of. Internal Friction Theory of Shaft Whirling, A. L. Kimball, Jr. Gen. Elec. Rev., vol. 27, no. 4, Apr. 1924, pp. 244-251, 11 figs. Shows Kimball's theory of internal friction in shafts as cause of whirling; shows that internal friction due to bending may cause a shaft to whirl when rotating at any speed above first critical speed.

The Whirling of Shafts, J. Frith and F. Buckingham. Instn. Elec. Engrs.—Jl., vol. 62, no. 325, Jan. 1924, pp. 107-113, 8 figs. Seeks to explain phenomenon of whirling by proving that it is essentially case of vibration and obeys laws of vibration, especially those relating to phase change between disturbing force and resulting displacement; describes experimental verifications of theories put forward.

SHAPERS

New Type. New 10-inch Stroke Shaping Machine. Machy. (Lond.), vol. 24, no. 615, July 10, 1924, p. 463, 3 figs. Describes machine recently constructed by Ormerods' Tool Co., Ltd., Hebden Bridge, for use in Doncaster Technical College Workshop, embodying some rather unusual features introduced with specific object of increasing educational value of machine, and including in a traversing head machine certain features usually associated with pillar type.

Production-Work Equipment. Equipping the Shaper for Production Work, D. A. Hampson. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 419-421, 4 figs. Notes on name-stamping attachment for shaper; fixture for cutting evenly spaced lines; knurling operations; performing simple bending operations on shaper.

SHEARS

Regulation Without Flywheels. Shears, Etc., Without Flywheels (Der schwungradlose Arbeitsreglerantrieb für Scheren u. dergl.). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 35, Aug. 30, 1924, p. 49 (advertising section), 2 figs. By use of variable-speed motor in conjunction with patented regulator, automatic variation in motor speed is secured which, it is claimed, is more effective than usual flywheel in reducing peak load of shears and similar machine tools.

Rolling-Mill. Large Shears for Cutting Sheets and Other Rolled Material (Grosse Scheren zum Zuschneiden von Blechen und anderem Walzgut). Kruppsche Monatshefte, vol. 5, July 1924, pp. 109-114, 10 figs. Details of various types of large-scale shears for cutting up rolling-mill products; 20-hp. electric motors for drive, 20 cuts per minute.

SHEET METAL

Deformation. Tension and Elastic Deformation in Uneven Membranes (Ueber Spannung und elastische Deformation von unebenen Membranen), M. Lagally. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 5, Oct. 1924, pp. 377-383, 4 figs. Examines tensions in uneven membranes and metal sheets of small bending strength. Develops a method for calculating torsion and elastic displacement from distribution of tension.

Standardization. Standardization of Sheet Metal, L. D. Mercer. Sheet Metal Worker, vol. 15, no. 9, May 23, 1924, pp. 327-328 and 350. Facts about waste in this industry, with recommendations on its elimination and on expansion of business.

SHEET-METAL WORKING

Accuracy in. Using Cutting and Stamping in Shaping (Die Verwendung der Schnitte und Stanzen in der spanlosen Formung), M. Evers. Praktische Maschinen-Konstrukteur, vol. 57, no. 14, Apr. 22, 1924, pp. 191-194, 14 figs. Discusses more accurate production of sheet-metal parts by cutting and stamping.

Stamping. Widening Applications of Metal Stamping, R. I. Miner. Forging—Stamping—Heat Treating, vol. 10, no. 2, Feb. 1924, pp. 75-78, 6 figs. Describes applications of sheet-metal stamping, i. e., work of those industries in which sheet metal is forced to take a desired shape through action of properly designed tools or dies, operated in a mechanical press.

SHELLS

Blank Diameters. See DIES, Shell, Blank Diameters.

Cast-Steel. See STEEL CASTINGS, Shells.

Drawing. See METAL DRAWING, Shells.

Tapered, Machining. Difficulties in Making Tapered Shells, J. Williams. Am. Mach., vol. 60, no. 16, Apr. 17, 1924, pp. 583-585, 2 figs. Drawing shells with parallel sides; cause of buckling and wrinkling; flowage of molecules; variation in density of metal.

SHERARDIZING

Development. Sherardising: Its Inception and Development, S. Cowper-Coles. Engineering, vol. 118, no. 3061, Aug. 29, 1924, pp. 277-278, 3 figs.

SHIP CONSTRUCTION

Welding Arc. See ELECTRIC WELDING ARC, Ship Construction.

SHIP DESIGN

Admiralty Coefficients. The Admiralty Coefficients. Shipbldg. & Shipg. Rec., vol. 23, no. 1, Jan. 3, 1924, pp. 14-16. Historical points in connection with resistance of ships, and inception of coefficients.

Aeronautics Applied to. Aeronautics in Naval Architecture, J. C. Hunsaker. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 1, for meeting Nov. 13-14, 1924, 17 pp. Discusses aeronautical knowledge and practices which may usefully be applied in ship design; deals with warship design; aerodynamics; structural materials; ship form and steering; propeller design; dimensional analysis; wave-making and submerged resistance; etc. See (abstract) in Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 725-728; and in Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 722-723.

Camber, Sheer and Bevel. A Deck Camber, Sheer and Bevel Nomogram, E. V. Telfer. Mar. Eng., vol. 29, no. 6, June 1924, pp. 362-363, 1 fig. Method for expressing mathematical relation for parabolic camber in nomographic form. Its application to ship joinery.

Corrugated Ship. The Monitor ship. Shipbldg. & Shipg. Rec., vol. 24, no. 14, Oct. 2, 1924, pp. 398-399, 1 fig. Analysis of claims put forward for corrugated or Monitor type of ship.

Curvature of Buttocks. High-Speed Forms and the Curvature of Buttocks, P. G. Rouse. Engineering, vol. 117, no. 3027, Jan. 4, 1924, pp. 3-5, 5 figs. Deals with drag in case of rather full-bodies craft driven at speeds excessive for their lengths.

Displacement-Draft. A Displacement-Draft Nomogram, E. V. Relfer. Shipbldg. & Shipg. Rec., vol. 24, no. 17, Oct. 23, 1924, pp. 493-494. States that work of Schmidt and Riddlesworth lends itself to nomographic development, and gives a displacement-draft nomogram, suggesting that it forms an interesting comparison with alternative cartesion diagrams published by Riddlesworth.

Displacement-Draught Fomulæ, W. H. Riddles-

worth. Instn. Nav. Architects, Instn. Engrs. & Shipbldrs. in Scotland, North East Coast Instn. Engrs. & Shipbldrs.—Advance Paper for joint meeting, June 27, 1924, 6 pp., 4 figs. See also Shipbldg. & Shipping Rec., vol. 24, no. 1, July 3, 1924, pp. 11-12 and 24, 3 figs. Results of study of block coefficient. Some formulas obtained have been in use at Fairfield Shipyard and have been included in lectures to students of Naval Architecture in Univ. of Glasgow.

Displacement and Stability Determination. The Mechanical Determination of Ship Displacement, Transverse and Longitudinal Stability, G. Kempf. Shipbldg. & Shipg. Rec., vol. 23, no. 20, May 15, 1924, pp. 580-582, 5 figs. Aims to reduce work involved in calculation of areas, ship displacement and stability, and to present stability problem to ships' officers in such a mechanical and simple form that they may be encouraged to interest themselves in stability of their ships. Abstracted translation of a paper read before Schiffbautechnische Gesellschaft.

Form, Selection of. Ships' Lines, J. Anderson. Shipbuilder, vol. 30, no. 163, Mar. 1924, pp. 189-192, 5 figs. Discussion of details of design; selection of form. Abstract of paper read before Glasgow Univ. Naval Architecture Soc.

Froude's Investigations. The Work of W. and R. E. Froude, A. W. Johns. Engineer, vol. 138, nos. 3598, 3599, and 3600, Dec. 12, 19, and 26, 1924, pp. 660-661, 687-689, and 715-717. Review of work of investigation of father and son, covering nearly 70 years, on phenomena attending all the phases of a ship's motion.

Girders. Girders in Ships, J. Foster-King. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper, no. 2821S, for meeting Nov. 14, 1924, 10 pp., 5 figs. Discusses design and construction of girders or framework in ships and practical application of beam theories in relation to conditions of fixity which obtain in ship work; formulas derived from experiment; comparison of various methods of construction for plating support; aspects of application.

Passenger Ships. Passenger Ship Design from an Independent Point of View, J. Anderson and R. Steele. Engineering, vol. 117, no. 3052, June 27, 1924, pp. 839-840, 1 fig. New design mainly for intermediate class of Atlantic passenger boats, having superior stability and showing large saving in fuel.

Problems. Ship Design, J. Biles. Engineering, vol. 117, no. 3052, June 27, 1924, pp. 841-844, 2 figs. See also Shipbldg. & Shipg. Rec., vol. 23, no. 26, June 26, 1924, pp. 763-765, 1 fig. Discusses speed, strength, stability, safety at sea, subdivision, etc. Paper, abridged, read at joint meeting of Instn. Naval Architects, Instn. Engrs. & Shipbldrs. in Scotland, and North-East Coast Instn. Engrs. & Shipbldrs., in Lond.

Resistance. The Prediction of Critical Speeds in Ship Resistance, J. Tutin. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper, for meeting Nov. 28, 1924, 12 pp. 13 figs. Deals with occurrence of "humps" and "hollows" on residuary resistance curves; geometrical method of locating humps and hollows on curve; reproduction and analysis of typical curves; calculation of "wave separation" for each vessel; chart for use in connection with analysis and prediction of critical speeds; effect of form and speed on wave separation.

The Resistance of Low and Average Speed Ships, J. C. Schokker. Mar. Eng. & Shipg. Age, vol. 29, no. 7, July 1924, pp. 432-434, 6 figs. Application of standard series experiments to present-day cargo-vessels; diagrams for calculating residual resistances.

Rolling Experiments. Results of Some Rolling Experiments on Ship Models, M. P. Payne. Engineering, vol. 117, nos. 3049 and 3050, June 6 and 13, 1924, pp. 745-749 and 777-780, 27 figs. Experiments to compare behavior of bulged and unbulged forms of vessels of Roy. Sovereign class as regards rolling, etc. (Abridged.) Paper read before Instn. Nav. Architects.

Skin Friction. The Effect of Length of the Skin Friction of Flat Surfaces, T. E. Stanton and D. Marshall. Engineering, vol. 117, no. 3048, May 30, 1924, pp. 718-719, 6 figs. Experiments undertaken to throw light on certain characteristics of distribution of friction over plane surfaces which are still obscure.

Stability. Stability and Rolling. Shipbldr., vol. 30, no. 165, May 1924. Contains following abstracts of papers delivered before different engineering institutions: Stability Within the Deck-Edge Range, W. R. G. Whiting, pp. 317-322, 9 figs.; Results of Some Rolling Experiments on Ship Models, M. P. Payne, pp. 322-329, 6 figs.; The Drift of Ships Caused by Rolling among Waves, K. Suyehiro, pp. 330-333, 3 figs.

Steel-Weight Nomogram. See ALIGNMENT CHARTS, Ship Steel Weights.

Strength. Strength of Ships. Shipbldr., vol. 30, no. 165, May 1924. Contains following abstracts of papers delivered before different engineering institutions: Development of Ships' Structural Design, H. W. Curchin, pp. 334-340, 10 figs.; Efficiency in Ship Construction from the Strength Point of View, J. Bruhn, pp. 340-344; High Elastic Limit Mild Steel and Its General Applications, G. W. Barr, F. G. Martin and A. T. Wall, pp. 344-345; Vibration of Ships, H. W. Nicholls, pp. 345-349, 1 fig.; Torsion of Ships, Gel. Vedeler, pp. 349-352, 2 figs.

Subdivision. The Subdivision of Passenger Ships, J. Foster King. Engineering, vol. 117, no. 3031, Feb. 1, 1924, pp. 157-159, 1 fig. See also Shipbldg. & Shipg. Rec., vol. 23, no. 5, Jan. 31, 1924, pp. 124-127 and 138. Corollary of paper by Archibald Denny read before Instn. Nav. Architects, Sept. 1923. Notes on possible subdivision methods; permeability factors; freeboard ratios. Proposed regulations for subdivision of passenger ships are given in Appendix.

Tank Model Experiments. Tank Model Experiments. Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 269-270. Résumé of methods employed, together with suggestion for incorporation of certain results in form of nomogram.

Towing Resistance. The Towing Problem. Mar. Engr. & Nav. Architect, vol. 47, no. 556, Jan. 1924, pp. 17-19, 2 figs. Discusses experimental solution with special reference to German tank work. Article is based on articles by Dr. Kempf, published in Werft, Reederei, Hafen.

Wetted Surface. Wetted Surface. Shipbldg. & Shipg. Rec., vol. 24, no. 18, Oct. 30, 1924, pp. 518-519, 1 fig. A simple expression for approximate determination of minimum wetted surface.

SHIP PROPELLERS

Blade-Element Design Method. The Blade Element Method of Propeller Design. Mar. Engr., vol. 47, no. 559, Apr. 1924, pp. 143-146, 13 figs. Discusses some possible methods of increasing efficiency of marine propellers, in connection with blade element theory.

Calculation. Theoretic Application of Tests with Model Screw Propellers (Beiträge zur theoretischen Verwertung der Modellschraubenversuche), M. Pröll. Schiffbau, vol. 25, no. 17, June 11, 1924, pp. 460-470, 10 figs. Discusses use of empirical mathematical data for precalculation of propellers; mathematical treatment of flow and currents about propeller.

Cavitation. The Extent of Cavitation in U. S. Scouts and Destroyers, E. F. Eggert. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 5,

for meeting Nov. 13-14, 1924, 4 pp., 1 fig. on supp. plate. See also Mar. Eng., vol. 22, no. 12, Dec. 1924, pp. 744-746 and 748, 1 fig.; and Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 717-718, 1 fig. Results of Model Basin experiments; introduction of air to propeller disk, through eddies forming behind struts, believed to be responsible for divergences between model and trial results rather than cavitation.

Contrapropellers. Distributors and Counter-propellers (''Distributeurs'' d'hélice et contre-hélices). Bul. Technique du Bureau Veritas, vol. 6, no. 4, Apr. 1924, pp. 70-76, 13 figs. Details of Hass fixed distributor, guiding water on its way to propeller, and Zeise counter-propeller situated between propeller and sternpost, and gives results of tests.

Propulsive Efficiency of Ships. Times Trade & Eng. Supp., vol. 13, no. 293, Feb. 16, 1924, p. 567, 1 fig. Describes new type of guide-blade apparatus, the Hass contrapropeller, in which guide blades are placed in front of revolving propeller and not behind it, as with normal Wagner type; results of tests made at Hamburg experimental tank on this apparatus and with new wake-using propellers for determining distribution of wake behind ship.

The Action of the Contrapropeller, O. Overgaard. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 591-594, 5 figs. Principle upon which contra-propeller acts; Wagner and Hass types; method of calculation; results with S. S. Norfolk.

Design. Marine Propeller Design, H. G. Bader. Mar. Engr., vol. 46, no. 566, Nov. 1924, pp. 418-421, 7 figs. A method based upon airfoil theory, with actual design for propellers of motorships with either four- or two-stroke engines. Abstracted translation of article in Werft Reederei Hafen, no. 17, 1923.

Practical Propeller Design. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, pp. 109-110, 2 figs. Description of improved method adopted by Hamburg Tank for designing a propeller, which enables wake to be accurately and simply determined. Translation of report by Hamburg Tank, Dec. 1923, prepared by G. Kempf and M. Popp.

Experimental Data. The Presentation of Propeller Experiment Data, E. V. Telfer. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper. no. 2718S, for meeting Mar. 21, 1924, 16 pp., 4 figs. Attention is principally directed to ''open'' performance of screw, but necessary modifications in ''behind'' condition is briefly discussed; it is concluded that development of internally propelled model shows that isolated model and screw research have their limitations. Bibliography.

Guiding Devices. See Contrapropellers.

Hydraulic. Hotchkiss Hydraulic Propellers. Engineering, vol. 117, no. 3027, Jan. 4, 1924, p. 13, 10 figs. partly on p. 16. Details of propellers constructed for 40-ft. tug.

Manufacture. Making Propellers, B. Shaw and J. Edgar. Serial article in Foundry Trade Jl., vol. 30, beginning Sept. 25 and ending Dec. 4, 1924, 66 figs. Sept. 25: Patternmaking and molding practice usually adopted in British foundries in making screw propellers. Oct. 2 and 9: Small propellers. Oct. 16: Construction of races; rapid production of propellers. Nov. 6: Loam molds. Nov. 13 and 20: Boss patterns. Dec. 4: Loose blades.

Model Experiments. Comparison of Model Propeller Experiments in Three Nations, D. W. Taylor. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 4, for meeting Nov. 13-14, 1924, 15 pp., 9 figs. on supp. plates. Compares experiments of four comprehensive groups of systematic tests made during last 20 years, and derives from them composite or average results for practical use covering wider field than any set of experiments taken alone; reductions of Durand's, Taylor's, Froude's, and Shaffran's results.

Shafts, Vibrations in. Vibration and Resonance of Propeller Shafts (Vibration et résonance des arbres porte-hélices), A. Blondel. Académie des Sciences—Comptes Rendus, vol. 178, no. 17, Apr. 22, 1924, pp. 1406-1411. Investigation of excessive vibrations causing ruptures in shafts.

Theory. The Problem of Propelling Screws (Il problema dell' elica propulsiva), L. Benasso. Ingegneria, vol. 3, no. 6, June 1, 1924, pp. 201-203, 3 figs. Discusses complex action of propellers in water, develops formulas for calculating velocity, coefficient of suction, etc.

SHIP PROPULSION

Air-Steam-Turbine. Air-Steam Turbines for Motor-Ship Auxiliary Machinery, H. Melan. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, p. 97. Particulars of new system of drive. Translated from Zeit. de Vereines deutscher Ingenieure, Jan. 12, 1924.

Cruisers. See WARSHIPS, Cruisers; Scout Cruisers.

Diesel-Electric. A 20,000 Ton Diesel-Electric Liner, P. J. Higgs. Inst. Mar. Engrs.—Trans., vol. 36, Aug. 1924, pp. 197-222 and (discussion) 222-234, 11 figs. Study of most efficient propelling machinery arrangement for 20,000-ton lines, as suitable for Trans-Atlantic trade. Abstract, with modifications, of thesis at Mass. Inst. Tech.

Diesel-Electric vs. Direct Diesel. Comparison of Diesel Electric and Direct Diesel Propelling Equipment, W. E. Thau and H. C. Coleman. Am. Mar. Engr., vol. 19, no. 10, Oct. 1924, pp. 14-19, 5 figs. See also Nautical Gaz., vol. 107, no. 14, Oct. 4, 1924, pp. 367 and 382-384, 3 figs.; Am. Shipg., vol. 18, no. 10, Oct. 1924, pp. 16-21, 5 figs., and Pac. Mar. Rev., vol. 21, no. 12, Dec. 1924, pp. 632-635, 5 figs. Results of studies made to determine most advantageous and satisfactory way of applying Diesel engine, with particular reference to conversion of present Shipping Board steam vessels to motorships, and conclusions reached.

Diesel-Engined Ships, Driving Gear. An Important Improvement in the Propulsion of Ships, A. Heller. Eng. Progress, vol. 5, no. 4, Apr. 1924, pp. 69-70, 1 fig. New Driving gear for ships designed by Vulkan Works, for Diesel-engined ships.

Diesel-Hydraulic. The Vulcan Diesel-Hydraulic Drive. Engineering, vol. 118, no. 3055, July 18, 1924, pp. 92-94, 8 figs. Describes system of ship propulsion, essentials of which comprise relatively high-speed Diesel engines, connected by means of oil-filled clutches to pinion shafts, geared (one on each side of a gear wheel) to propeller shaft which runs at speed of revolution most suitable to permit of maximum propulsive efficiency. Particulars of system as installed on ship ''Vulcan,'' of 2000 tons deadweight.

Trial Runs of the ''Vulcan Gear'' Ship (Probefahrten des ''Vulcangetriebeschiffes''). Schiffbau, vol. 25, no. 22, Aug. 27, 1924, pp. 602-604. Trial runs show efficiencies of 96½ per cent for combined gear; three main connections for driving and for reversing.

Diesel vs. Turbine. Diesel vs. Turbine on Hog Island Ships, A. H. Jansson. Mar. Rev., vol. 54, no. 4, Apr. 1924, pp. 119-126, 10 figs. Comparison of performance of motorship Seekonk and steamship Hog Island.

Operating Costs of Diesel Electric and Geared Turbine Drives Compared. Nautical Gaz., vol. 107, no. 4, July 26, 1924, pp. 104-105, 1 fig. Comparison of Diesel electric drive and geared

turbine drive; economies compared and fuel comparison.

Electric. Electricity as the Motive Power for Ships, L. Rothera. Inst. Mar. Engrs.—Trans., vol. 36, June 1924, pp. 37-94, 15 figs. Discusses possible forms of drive and their limits; Diesel-electric and steam-electric drive; comparison of d.c. and a.c. for operating.

Motors for Ship Propulsion, L. J. Hunt. Electrician, vol. 93, no. 2410, July 25, 1924, pp. 93-94, 3 figs. Discusses simple method of speed control; objections to use of d.c. system; developments in alternator design.

Ferries. See FERRIES, Electric Propulsion.

Internal-Combustion Engines, Application. See INTERNAL-COMBUSTION ENGINES, Railway Traction.

Nodal Drive for Geared Turbines. The Nodal Drive for Geared Turbine Ships, J. H. Smith and J. Wilkie. Instn. Mech. Engrs—Proc., no. 4, July 1924, pp. 661-671, 8 figs. Explains nodal drive by means of illustrations; considers reasons which have been given for failure of double-reduction gearing.

Progress. The Progress in Marine Propulsion during the Last Ten Years and Some of Its Possibilities, A. C. Ross. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper for meeting June 27, 1924, 6 pp. Review of developments.

Resistance and. Resistance and Propulsion. Shipbldr., vol. 30, no. 165, May 1924. Contains following abstracts of papers delivered before different engineering institutions: Essential Factors in Ship Propeller Design, A. F. Ainslie, pp. 369-372, 4 figs.; Influence of Propeller Revolutions upon the Propulsive Efficiency of Merchant Ships, K. Schaffran, pp. 372-381, 8 figs. Presentation of Propeller Experiment Data, E. V. Telfer, pp. 381-383, 1 fig.; Effect of Wind and Waves on the Propulsion of Ships, J. L. Kent, pp. 383-388, 3 figs.; Effect of Length on the Skin Friction of Flat Surfaces, T. E. Stanton and D. Marshall, pp. 389-391, 2 figs.; Skin Friction Resistance and Law of Comparison, A. Shigemitsu, pp. 392-395, 2 figs.; Analysis of Ship Resistance, J. Tutin, pp. 395-402, 1 fig.

River Vessels. Turbine Drive for River Steamers (Der Turboantrieb von Flussdampfern), E. A. Kraft. Gewerbefleiss, vol. 103, no. 8, Aug. 1924, pp. 125-129, 3 figs. Details of A. E. G. turbines for driving freight steamers Duisburg and Düsseldorf, of Hamburg-Amerika line, double-screw vessels of 1500 tons carrying capacity.

Superheated Steam in. See SUPERHEATED STEAM, Advantages.

Turbine. Ship Drive by Means of Ljungström or "Stal" Turbine (Schiffsantrieb mit Ljungström- oder Stalturbinen), S. Bock. Schiffbau, vol. 25, nos. 22 and 23, Aug. 27 and Sept. 10, 1924, pp. 597-601 and 627-632, 8 figs. Details of Stal turbine, radial steam turbine which is directly coupled to propeller shaft by gearing, resulting in maximum reduction of losses. Comparative fuel consumption. Comparison of Diesel engine and Stal turbine.

Turbo-electric. Electric Transmission of Power for Propelling Machinery, W. J. Belsey. Mar. Engr. & Motorship Bldr., vol. 47, no. 564, Sept. 1924, pp. 334-335, 3 figs. Discusses turbo- and Diesel-electric drives, their characteristics and advantages. Abstract of paper read at First World Power Conference.

Types. Power for Ship Propulsion, H. G. Hammar. Engineering, vol. 118, no. 3056; July 25, 1924, p. 148. Discusses recent advance in turbine operation, Ljungström and deLaval types and installations, Scotch boilers for Swedish Merchant Marine, air-preheaters, reversible propellers, Diesel engines, etc. Abstract of paper read before World Power Conference.

Various Types of Propulsion, D. G. Taylor. Pac. Mar. Rev., vol. 21, no. 7, July 1924, pp. 366-370. Comparison of overall economy of geared turbine, turbo-electric, Diesel-electric, direct Diesel, and reciprocating steam-engine plants in diverse services.

Wind. See SHIPS, Flettner Rotor.

Wind and Waves, Effect of. Effect of Wind and Waves on Propulsion of Ships, J. L. Kent. Mar. Eng. & Shipg. Age, vol. 29, no. 9, Sept. 1924, pp. 536-542, 4 figs. Deals with observations of weather encountered and behavior of different types of vessels on ocean voyages to determine causes of loss of speed in ships at sea.

The Effect of Wind and Waves on the Propulsion of Ships. Shipbldg. & Shipping Rec., vol. 24, no. 5, July 31, 1924, pp. 142-146, 3 figs. Discusses percentage of increase in power due to wind and waves, analysis for wake, propulsive efficiencies at sea, sea speeds and admiralty constants, resistance and thrusts in tons, etc., with reference to Kent's paper at Naval Architects' meetings.

SHIP SALVAGE

German Fleet. The Salvage of the German Fleet at Scapa Flow. Engineering, vol. 118, no. 3059, Aug. 15, 1924, pp. 233-235, 9 figs. partly on p. 236. How floating dock, used for testing submarines by German naval authorities, was converted for use in raising the various units of ex-German fleet.

Methods. The Salvage of Stranded and Sunken Ships, Ch. Wall. Shipbldg. & Shipg. Rec., vol. 23, no. 10, Mar. 6, 1924, pp. 283-284. Material used in the various operations; physiology of diver; salvage pumping; salvage vessels; refloating by means of pontoons; salvage in shallow water; refloating by cofferdam. Abstract of paper read before Assn. Technique Maritime.

SHIP WRECKING

Warships. Scrapping Warships, H. E. Rossell. Soc. Nav. Architects & Mar. Engrs.—Advance Paper no. 9, for meeting Nov. 13-14, 1924, 11 pp., 11 figs. on supp. plates. See (abstract) in Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 733-735; and Shipbldg. & Shipg. Rec., vol. 24, no. 23, Dec. 4, 1924, pp. 657-663, 10 figs. Details obtained principally through experience of Philadelphia Navy Yard in making five battleships unsuitable for warlike purposes and in cutting up for scrap two partially completed battle cruisers on building ways, and five complete battleships afloat; also information from New York Navy Yard and five private plants.

SHIPBUILDING

Channel Steel Construction. Build Ships of Steel Channels. Mar. Rev., vol. 54, no. 3, Mar. 1924, pp. 92-94, 4 figs. Describes channel steel construction system for ships, developed by Channel Steel Barge Co., Inc., Rome, N. Y., principal feature of which is that outer skin of vessel is made entirely of standard steel channels which run lengthwise of hull with flanges turned upward. Particularly adapted for inland waterway vessels of any type and small steamers or motorships operating on Great Lakes and coast.

Costs Reduction. How to Reduce Shipbuilding Costs. Shipbldg. & Shipg. Rec., Special No., Jan. 2, 1924, pp. 47-48, 3 figs., partly on supp. plates. Considers evils to be overcome and improvements which can be effected to enable shipbuilder to secure an economical production cost.

Efficiency. Efficiency in Ship Construction from the Strength Point of View, J. Bruhn. Shipbldg. & Shipg. Rec., vol. 23, no. 11, Mar. 13, 1924, pp.

309-311. Draws attention to fact that factors affecting efficiency of a ship's construction, which are determined by trade vessel is engaged in, seems to a large extent to have been ignored, compared with factors associated with distribution of material. Abstract of paper read before Inst. Engrs. & Shipbldrs. in Scotland.

Europe, 1923. Shipbuilding in 1923. Shipbldr., vol. 30, no. 161, Jan. 1924, pp. 81-89, 2 figs. Shipbuilding in Germany, France, Holland, and Italy.

Great Britain, 1923. British Shipbuilding in 1923 and the Coming Year. Shipbldr., vol. 30, no. 161, Jan. 1924, pp. 69-81, 20 figs. Year's output and prospects for 1924.

Merchant. Merchant Shipbuilding and Sea Transport. Shipbldr., vol. 30, no. 165, May 1924. Contains following abstracts of papers delivered before different engineering institutions: Foreign Trade and Shipbuilding, R. Y. Sanders, pp. 297-302, 2 figs.; Sea-Borne Coastal Trade, A. H. Read, pp. 302-305; Future of Sea Transport, A. Hurd, pp. 306-308; Development of the Airship with Special Reference to Transport, C. D. Burney; Influence of Type of Propelling Machinery on Running Costs of Ships, W. G. A. Perring, pp. 311-316, 6 figs.

Roller Bearings in. See BEARINGS, ROLLER, Shipbuilding.

U. S. Merchant Marine. The Future of the United States Merchant Marine, A. C. Holzapfel. Pac. Mar. Rev., vol. 21, nos. 2 and 3, Feb. and Mar. 1924, pp. 108-109, and 163, 38 and 43. Feb.: Necessity for increased efficiency and subsidy; Diesel-electric drive; hydraulic transmission. Mar.: Insurance factor and suggestions for mutual coöperative insurance; recommends method of curing handicap of high wages by using naval crews and officers.

World's Output. Mercantile Shipbuilding in 1923. Shipbldg. & Shipg. Rec., vol. 23, no. 4, Jan. 24, 1924, pp. 103-109, 1 fig. Lloyd's Register, annual survey of world's shipbuilding.

The World's Shipbuilding. Engineering, vol. 117, no. 3030, Jan. 25, 1924, pp. 106-107. Number and tonnage of merchant vesesls of 100 tons gross and upward launched in various countries of world during years 1892-1923.

SHIPS

Aircraft Carriers. See NAVAL AIRCRAFT, Carriers.

Aluminum and Its Alloys, Use on. See ALUMINUM ALLOYS, Use on Board Ship.

Auxiliaries, Electric Drive for. A New Electric Drive for Ship and Other Auxiliaries, G. Austin. Shipbldg. & Shipg. Rec., vol. 24, no. 21, Nov. 20, 1924, pp. 595-596, 2 figs. Describes developments which are result of investigation to determine whether it would be possible to improve performance of electric motor by production of a motor which would, in operation, function in a simialr way to steam engine, which have all been tested for a prolonged period on a sufficiently large workshop scale to be convincing. Abstract of paper read before Instn. Engrs. & Shipbldrs. in Scotland.

The Austin Constant-Current Motor for Ship Auxiliaries. Engineering, vol. 118, no. 3074, Nov. 28, 1924, pp. 734-735, 2 figs. Essential feature of Austin system of drive lies in use of constant-current motor in place of constant-voltage motor of current practice; details of d.c. generator and motor.

The Electric Motor Drive for Auxiliary Machines on Board Ship, L. Miller. Inst. Mar. Engrs.—Trans., vol. 35, Aug. 1924, pp. 234-290 and (discussion) 290-306, 35 figs. Reviews position of electric-motor drive of auxiliary machinery and considers advantages to be obtained from adoption of this type of drive.

Auxiliaries, Water Rates and Steam Consumption. Water Rates and Steam Consumption of Auxiliaries, E. A. Stevens, Jr., and H. E. Brelsford. Mar. Eng., vol. 29, nos. 10 and 11, Oct. and Nov. 1924, pp. 611-616 and 676-681, and vol. 30, no. 1, Jan. 1925, pp. 52-54 and 57, 7 figs. Oct.: Steam for galley, pantry and heating; make-up feedwater; total steam consumption. Nov.: Steam consumption of auxiliaries in port; cargo handling and bunkering; problems showing calculated and actua lresults. Jan.: Formulas and values to be used in short-cut method of making approximate or preliminary calculations.

Cable-Laying. The Cable-Laying and Repairing Steamer "Edouard Suenson." Engineering, vol. 118, nos. 3058 and 3060, Aug. 8 and 22, 1924, pp. 196-197 and 269-270, 17 figs. partly on supp. plates and p. 262. Details of design and construction of steamer constructed at Royal Dockyard, Copenhagen; length, 71.5 m.; displacement, loaded, 2520 tons; speed, 11 knots; oil fuel equipment.

The Twin-Screw Cable Steamship "Cyrus Field." Shipbldr., vol. 31, no. 169, Sept. 1924, pp. 123-128, 10 figs. partly on supp. plate. Describes twin-screw cable-laying and repairing steamship built by Société Anonyme des Chantier et Ateliers de Saint Nazaire Penhoët for Western Union Telegraph Co.; length between perpendiculars, 211 ft.; breadth, molded, 34 ft.; depth, molded to upper deck, 18 ft. 6 in.; propelling machinery consists of two sets of triple-expansion engines of direct-acting surface-condensing type, designed for working pressure of 180 lb. per sq. in. and for 135 r.p.m.

Cargo. Australian Commonwealth Liner T. SS. "Fordsdale." Shipbldg. & Shipg. Rec., vol. 24, no. 14, Oct. 2, 1924, pp. 395-397, 3 figs. Refrigerated cargo steamer of 12-700 tons deadweight; largest merchant ship built in Australia.

Cargo Steamer of 9,200 Tons D. W. Shipbldg. & Shipg. Rec., vol. 23, no. 6, Feb. 7, 1924, pp. 155-159, 9 figs. partly on supp. plate. Description of British Monarch, built for Monarch Steamship Co., Glasgow; length between perpendiculars, 420 ft.; breadth, molded, 54 ft.; depth, molded, 31 ft. 6 in.; net tonnage, 3538; service speed, 13½ knots; fitted with set of Brown-Curtis double-reduction geared turbines.

8,800-Ton Deadweight Cargo Steamers for the Hamburg-Amerika Line. Shipbldg. & Shipg. Rec., vol. 23, no. 7, Feb. 14, 1924, pp. 188-190, 4 figs. SS. Idarwald, built by Deutsche Werft, Hamburg, and fitted with Hass patent propeller guide blades.

Great Lakes Grain-Carrying Steamer of 2400 Tons D. W. Shipbldg. & Shipg. Rec., vol. 23, no. 14, Apr. 3, 1924, pp. 391-392 and 397, 2 figs. Particulars of single-screw steamer Norman P. Clement, built for East. Steamship Co., Ltd., Port Colborne, Can.; length overall, 258 ft.; breadth, molded, 43 ft. 1 in. depth, molded, 20 ft.; draft, loaded, 14 ft.

Performance Tests of Steamship Charles M. Schwab. Mar. Eng., vol. 29, no. 5, May 1924, pp. 278-284, 5 figs. Principal data and results of tests carried out on new Great Lakes bulk freight; length, overall, 600 ft.; breadth, molded, 60 ft.; depth, 32 ft.; displacement, 17,000 tons.

Self-Unloading Bulk Cargo Vessels of the Great Lakes, H. Penton and H. C. Sadler. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 3, for meeting Nov. 13-14, 1924, 8 pp., 9 figs. on supp. plates. Outline of method of solving problems involved and description of leading features of vessels. See (abstract) in Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 723-724, 4 figs.

The Turbine-Driven Steamers "Principessa Giovanna" and "Principessa Maria." Engineering, vol. 117, no. 3052, June 27, 1924, pp. 821-822, 15 figs. partly on supp. plates and p. 828. Particulars of cargo sister ships built in 1923 at Taranto shipyard belonging to Franco Tosi for Lloyd Sabaudo Co., Genoa. Steel twin-screw ships of awning-deck type, propelling machinery being geared turbines supplied with steam from cylindrical boilers fitted for burning either coal or oil fuel. Length, overall, 460 ft.; extreme breadth, 59 ft.; deadweight, 10,500 summer, and 10,000 winter.

Toledo Shipbuilding Company Completes Modern Bulk Freighter William K. Field for Reiss Steamship Company. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 216-222, 8 figs. Particulars of single-screw vessel of 8000 gross tons; single deck type built on arch and web frame system; length, overall, 604 ft.; beam, molded, 60 ft.; depth, molded, 32 ft.

Cattle. See Passenger-Cargo.

Colliers. Self-Trimming Collier of 3,300 Tons Deadweight. Shipbldg. & Shipg. Rec., vol. 23, no. 25, June 19, 1924, pp. 731-733, 2 figs. SS. "Dashwood" built and engined by Vickers, Ltd., for Wm. France, Fenwick & Co., Ltd., London. Length, 281 ft.; breadth, 40 ft.; depth, molded, 20 ft. 11 in.; draft, 19 ft.; gross tonnage, 2181 tons.

Compasses. See COMPASSES.

Construction. See SHIPBUILDING.

Container. Rail and Water Transport in Containers, H. Schlatter. Indus. Mgmt. (Lond.), vol. 11, no. 3, Feb. 7, 1924, pp. 81-83, 1 fig. Use of strongly-built containers as buoyancy chambers, saving incorporation of such chambers in body of craft; describes container ship designed in accordance with this idea, consisting of floating compartments at stem and stern, supporting an intermediate openwork truss structure to receive containers, which can also be accommodated in end compartments if necessary. From Schiffbau.

Corrosion in. How the Ravages of Corrosion Can Be Reduced, C. A. McAllister. Mar. Eng., vol. 29, no. 11, Nov. 1924, pp. 663-664. Bottom plates of Leviathan, containing 1.67 per cent of copper, show surprising resistance to corrosion. Where increased cost of copper-bearing steels is justified in shipbuilding.

Design. See SHIP DESIGN.

Electric Equipment for. Marine Electrical Equipment. Steamship, vol. 36, no. 423, Sept. 1924, pp. 92-95, 4 figs. Describes auxiliary turbo-generator sets, auxiliary engine-driven generators, motors and winches made by Metropolitan-Vickers Electrical Co.

Fishing Boats. See FISHING BOATS.

Flettner Rotor. Flettner's Sailless Ship Explained. Power, vol. 60, no. 27, Dec. 30, 1924, pp. 1054-1056, 7 figs. Employs principle of curving baseball; spinning cylinders distort wind currents; resultant driving force ten times that of same sail area; maneuvering simpler than with sails; inventor predicts use as auxiliary to engine drive.

Jubilee Meeting of the German Shipbuilding Society (Die Jubiläumsversammlung der Schiffbautechnischen Gesselschaft). Schiffbau, vol. 25, no. 29, Dec. 10, 1924, pp. 841-855, 15 figs. Contains paper by Flettner on Application of Our Knowledge of Aerodynamics to Wind Drive of Ships; theory of rotor ship.

Problem of the Wind-Power Ship (Das Problem des Windkraftschiffes), W. Buchmann. Dinglers Polytechnisches Jl., vol. 339, no. 22, Nov. 1924, pp. 221-223, 5 figs. Principles of Flettner rotor ship and their application.

The Flettner Rotor Ship (Das Walzensegel von Flettner). Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 47, Nov. 22, 1924, p. 1218, 7 figs. See also Engineer, vol. 138, no. 3596, Nov. 28, 1924, p. 608, 1 fig. Discusses principles upon which design is based.

See also AERODYNAMICS, Magnus Effect; AIRPLANES, Flettner Principle, Application of.

Guiding by Radio Signals. See DIRECTION FINDING.

Hoisting Apparatus. Hoisting Apparatus on Board Ship (Note sur les appareils de levage à bord des navires). Bul. Technique du Bureau Veritas, vol. 6, no. 11, Nov. 1924, pp. 201-205, 6 figs. Deals with steam and electric winches, pumping machinery, cranes, etc., their efficiency, power consumption, etc.

Inspection. General Rules and Regulations Prescribed by the Board of Supervising Inspectors. U. S. Dept. Commerce, Steamboat Inspection Service, form 801C, Apr. 4, 1924, 154 pp. Details of amendments of rules and regulations for bays, sounds, and lakes other than Great Lakes made by Board of Supervising Inspectors, covering boilers, fire apparatus, inspection of vessels, ferry boats, barges, etc., and instruments, machines, and equipments approved for use on vessels.

Lake Vessels. Safety Factors in Lake Ships, A. Lindblad. Mar. Rev., vol. 54, no. 2, Feb. 1924, pp. 58-62, 5 figs. Discusses sheer, bulkheads and bilging calculations as adapted for lake vessels; rolling periods.

See also Cargo.

Lifeboats. See LIFEBOATS; MOTOR BOATS, Lifeboats.

Lighting. Lighting System of the S. S. "Leviathan," W. N. Zippler. Illuminating Eng. Soc.—Trans., vol. 19, no. 1, Jan. 1924, pp. 28-42, 4 figs. Description of system installed at time of rebuilding for use of U. S. Shipg. Board. Describes wiring system and difficulties encountered in reconditioning vessels due to faults in original installation.

Lightships. See LIGHTSHIPS.

Liners. See Passenger; Passenger-Cargo.

Loading. See CARGO HANDLING.

Machinery Developments. Marine Engineering Progress in 1923. Shipbldg. & Shipg. Rec., Special No., Jan. 2, 1924, pp. 57-58, 10 figs. on pp. 49-56. Review of some of the principal developments which have taken place in marine engines, steam, oil and turbines, in boilers, and auxiliary machinery.

Machinery, Effect of Sea Water on. Effect of Sea Water on Development of Machinery on Board Ship (Der Einfluss des Seewasers auf die Entwicklung der Maschinenanlagen an Bord von Seeschiffen), Schulz. Brennstoff- u. Wärmewirtschaft, vol. 6, no. 11, Nov. 1924, pp. 226-229. Discusses boilers, condensers, feedwater producers, pipe lines, etc., subject to corrosion, and developments to reduce it.

Marine Borers, Protection Against. See MARINE BORERS, Protection Against.

Motorships. See MOTORSHIPS.

Oil-Burning. Experiences with Oil-Fired Installations on Board Ship (Betriebserfahrungen mit Oelfeuerungsanlagen an Bord), P. Müller. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 18, May 3, 1924, pp. 442-449, 25 figs. Describes oil-furnace installations of steamers of Hamburg-South American Steamship Co.; practical experiences gathered in past two years; damages and their prevention; mean values obtained on steamers Cap Norte and La Coruña during sixth voyage; summary of main advantages of oil firing over coal firing on ships.

Individual Forced Draft Fuel Oil Burners, A. M. Charlton. Am. Soc. Naval Engrs.—Jl., vol. 36, no. 2, May 1924, pp. 208-243, 17 figs. Details of design and operation. Describes installations on some vessels.

Oil Burning in Passenger-Carrying Steamships. Mar. Engr. & Naval Architect, vol. 47, no. 558, Mar. 1924, p. 95. British Board of Trade Committee's recommendations in view of recent experience.

Oil-Fuel Handling. Handling Fuel Oil Aboardship, J. Heckling. Mar. Eng. and Shipg. Age, vol. 29, no. 7, July 1924, pp. 423-426, 6 figs. Methods of conserving fuel oil and promoting safety by proper storage and pumping facilities.

Oil Tankers. Extinguishing Oil Fires by Using Liquid Carbon Dioxide, W. H. Freygang. Pac. Mar. Rev., vol. 21, no. 8, Aug. 1924, pp. 423-424, 2 figs. Details of Lux system of extinguishing oil fires by not permitting liquefied carbon dioxide to boil until it is discharged from conveying pipe into atmosphere.

Notes on Cleaning of Tankers, H. Barringer. Instn. Petroleum Technologists—Jl., vol. 10, no. 46, Nov. 1924, pp. 810-811. Briefly summarizes methods employed at present time under various conditions, of cleaning of tank vessels after carriage of various liquids.

Oil Transport: The Oil Tank Ship, H. Barringer. Instn. Petroleum Technologists—Jl., vol. 10, no. 44, July 1924, pp. 560-581 and (discussion) 582-583, 7 figs. Earlier transport of oil and different stages of development which have led to adoption of present design; description of modern oil tanker.

See also COMPASSES, Radio; MOTORSHIPS, Oil Tankers.

Paddle-Wheel. See Passenger.

Painting. See PAINTING, Ships.

Passenger. Anchor-Donaldson Line Places New Intermediate Type Liner in Glasgow and Montreal Passenger Service. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 149-154, 3 figs. Description of twin-screw geared turbine cabin and third class passenger liner Athenia; overall length, 538 ft. 2 in.; breadth, 66 ft.; depth, 50 ft. 3 in.; gross tonnage, 12,000 two sets Brown-Curtis turbines of 8700 s.hp.

Express Passenger Steamer Catalina, L. E. Caverly. Pacific Mar. Rev., vol. 21, no. 4, Apr. 1924, pp. 218-220, 3 figs. Particulars of steel twin-screw vessel built for Wilmington Transportation Co., designed for daylight excursion service between Los Angeles Harbor, Cal., and Avalon, Catalina Island; two sets 3-cylinder triple-expansion engines; length, overall, 301 ft. 7½ in.; breadth, molded at main deck, 52 ft.; depth, molded, 21 ft.; displacement at 3 ft. 6 in. draft, 2390 tons.

French-Built Intermediate Liner for South American Trade. Shipbldg. & Shipg. Rec., vol. 23, no. 2, Jan. 10, 1924, pp. 38 and 48, 1 fig. on supp. plate. Describes T.SS Lipari, built by Société des Ateliers et Chantiers de la Loire for Compagnie des Chargeurs Réunis for Buenos Aires service; length between perpendiculars, 479 ft.; length, overall, 500 ft.; breadth, molded, 59 ft. 3 in.; depth, molded, 38 ft.; net tonnage, 6116; propelling machinery, two sets turbines driving twin screws through double-reduction gearing.

New Steamship Boston Goes Into Service. Mar. Eng. and Shipg. Age, vol. 29, no. 7, July 1924, pp. 399-407, 23 figs. First of two express sister ships placed on New York-Boston run by Eastern Steamship Co. Length, overall, 402 ft.; beam, molded, 71 ft. 2 in.; depth, molded to main deck, 23 ft. 9 in.; net tonnage, 2703; steel, twin-screw passenger steamer with sponsoned hull and four-deck, steel and wood superstructure.

Oil-Burning Cross-Channel Steamers. Mar. Engr., vol. 47, no. 566, Nov. 1924, pp. 409-415, 13 figs. See also Shipbldg. & Shipg. Rec., vol. 24, no. 18, Oct. 30, 1924, pp. 512-515, 8 figs., partly on supp. plate. Particulars of "Dinard" and "St. Briac," built and engined by Wm. Denny & Bros. for South. Ry. Co. for services to France and Channel Islands from Southampton, Eng. Length, overall, 325 ft.; breadth, molded 41 ft.; depth, molded to main deck, 16 ft.; gross tonnage, 2291 tons.

S. S. Alexander Hamilton Joins Hudson River Fleet. Mar. Eng. & Shipg. Age, vol. 29, no. 8, Aug. 1924, pp. 459-465, 19 figs. New oil-burning steamer built by Bethlehem Shipbldg. Corpn. for Hudson River Day Line carries over 4000 passengers; length, overall, 348 ft.; beam, molded, 42 ft.; depth, molded, 13 ft. 8 in.; load draft, 8 ft. 1 in.; propelling machinery consists of inclined, triple-expansion engine having cylinders 36½ in., 57 in. and 85 in. in diameter by 72 in. stroke.

The Anchor Liner "California." Shipbldr., vol. 30, no. 161, Jan. 1924, pp. 10-19, 12 figs. partly on supp. plates. Has gross tonnage of 16,792 and accommodations for 1760 passengers; details of machinery and equipment.

The Atlantic Transport Liner Minnetonka. Engineer, vol. 137, no. 3566, May 2, 1924, pp. 485-486, 6 figs. partly on p. 480. See also Shipbldg. & Shipg. Rec., vol. 23, no. 18, May 1, 1924, pp. 522-527, 9 figs. Sister ship of Minnewaska has single-reduction Brown-Curtis turbines and oil-fired water-tube boilers; extensive adoption of electric auxiliaries and cargo-handling gear; gross tonnage 20,000 tons; built by Harland & Wolff.

The Largest Paddle Steamers Ever Built. Mar. Eng., vol. 29, no. 11, Nov. 1924, pp. 642-648, 13 figs. Particulars of Great Lakes steamers Greater Buffalo and Greater Detroit, built by Am. Ship Bldg. Co., Cleveland, Ohio, for Detroit & Cleveland Navigation Co. Length, overall, 535 ft.; beam, molded, 58 ft.; depth, molded, 23 ft. 7 in.

The Twin-Screw Geared Turbine Orient Liner "Orama." Engineering, vol. 118, nos. 3068 and 3070, Oct. 17 and 31, 1924, pp. 543-545 and 601-604, 29 figs. partly on supp. plates. See also Engineer, vol. 137, no. 3569, May 23, 1924, p. 567, 5 figs., partly on supp. plate. Details of 20,000-ton passenger and mail steamer constructed by Vickers Ltd.

Twenty-One Knot Turbo-Electric Liner. Shipbldg. & Shipg. Rec., vol. 23, no. 25, June 19, 1924, p. 735, 1 fig. Particulars of proposed all-electric express passenger liner for San Francisco-Honolulu service of Matson Navigation Co., San Francisco. Length, oyerall, 578 ft.; beam, molded, 75 ft.; depth, molded to shelter deck, 45 ft.; displacement, 18,000 tons; speed service of 21 knots; propelled by turbo-electric installation of about 24,000 hp., steam being supplied by 12 oil-fired boilers.

Passenger-Cargo. A New Passenger and Cargo Liner for the British India Steam Navigation Company. Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 259-264, 14 figs. Particulars of "Tilawa" built and engined by R. & W. Hawthorn, Leslie & Co., Ltd., Eng., for service in India and Far East trade. Fitted with single set of quadruple-expansion engines developing 5000 i.hp. at 85 r.p.m. Scotch boilers. Length, overall, 467 ft.; breadth, molded, 59.5 ft.; depth, molded, 40 ft.; net tonnage, 6153 tons.

Passenger and Cargo Liner "Chantilly." Shipbldg. & Shipg. Rec., vol. 24, no. 2, July 10, 1924, pp. 45-46, and 49, 6 figs. on supp. plate. Twin-

screw passenger and cargo liner built and engined by Ateliers et Chantiers de la Loire for services contractuels des Messageries Maritimes; length, overall, 501 ft.; breadth, 59.2 ft.; depth, 38 ft.; displacement, loaded, 16,137 tons; maximum speed, 16 knots; propelling machinery consists of two sets of Parsons impulse-reaction type turbines, each set driving its propeller shaft through double-reduction gearing.

The British India Passenger and Cargo Liner "Tairea." Mar. Engr., vol. 47, no. 565, Oct. 1924, pp. 382-387, 14 figs. Contrasts the "Tilawa" and the "Tairea," two new classes of passenger-cargo steamers recently added to Far Eastern services of British Steam Navigation Co., and describes latter. Length between perpendiculars, 450 ft.; breadth, molded, 60 ft.; depth, molded to upper deck, 41 ft.; gross tonnage, 8000 tons.

The Latest Cunard Cabin-Class Liner. Shipbldg. & Shipg. Rec., vol. 24, no. 12, Sept. 18, 1924, pp. 337-345, 11 figs. Twin-screw passenger and cargo liner built by Swan, Hunter & Wigham Richardson and engined by Wallsend Shipway & Eng. Co.; gross tonnage, 14,000 tons; speed, 14 knots.

The New German Liner "Columbus." Shipbldg. & Shipg. Rec., vol. 23, no. 3, Jan. 17, 1924, pp. 69-73, 3 figs. See also Mar. Eng. & Shipg. Age, vol. 29, no. 2, Feb. 1924, pp. 81-89, 11 figs. Built and engined by F. Schichau, Danzig, for Norddeutscher Lloyd; length overall, 386.2 meters; length between perpendiculars, 228.67 m.; beam, 25.3 m.; depth to main deck, 16.46 m.; deadweight capacity, 10,000 tons.

The Passenger, Cargo and Cattle Steamship "St. Magnus." Shipbuilder, vol. 31, no. 171, Nov. 1924, pp. 225-231, 6 figs. partly on supp. plates. Particulars of vessel built to order of of North of Scotland and Orkney and Shetland Steam Navigation Co. Ltd., for their trade between Leith, Aberdeen, and Orkney and Shetland Islands; length, overall, 250 ft.; breadth, molded, 35 ft.; depth, molded to upper deck, 18 ft.; load, deadweight, 1260 tons; triple-expansion engines.

United American Liner "Cleveland." Shipbldg. & Shipg. Rec., vol. 23, no. 19, May 8, 1924, pp. 549-553, 6 figs. Reconditioned and converted to oil burning; length, overall, 597 ft.; breadth, 65 ft. 3 in.; depth, molded, 46 ft. 9 in.; displacement, 23,000 tons; maximum speed, 16 knots; 11,500 i.hp.; propelled by 2 quadruple-expansion engined balanced on Yarrow, Schlick & Tweedy system.

Performance Standards. Application of Fuel Conservation and Engineering Performance Standards to Shipping Board Vessels, C. J. Jefferson. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 8, for meeting Nov. 13-14, 1924, 9 pp., 5 figs. on supp. plates. Voyage reports; education of operating personnel; equipment modifications; methods employed and results obtained; sea and port performance; total fuel savings.

Propellers. See SHIP PROPELLERS.

Propelling Machinery. The Trend of Development of Marine Propelling Machinery, Geo. G. Goodwin. Instn. Mech. Engrs.—Proc., no. 5, 1924, pp. 823-853, 1 fig. Conclusions are that (1) reciprocating steam engine will continue to be most common engine in use in mercantile marine for some years, but its predominance in number and in tonnage of ships in which it is fitted will gradually be reduced; (2) steam turbine of geared type must continue to be engine for all ships of highest power, as in Navy; (3) heavy oil engine will be propelling engine of increasing number of cargo ships and ships of low and moderate power, but its rate of increase of use will be retarded while its cost remains high.

Propelling Machinery and Running Costs. Influence of Type of Propelling Machinery on the Running Costs of Ships, W. G. A. Perring. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper for meeting Jan. 18, 1924, 20 pp., 11 figs. Author attempts to set out various items that go to make up running costs of ship and to ascertain how these are affected by type of propelling machinery.

Propulsion. See SHIP PROPULSION.

Radio Apparatus for. See RADIOTELEGRAPHY, Ships.

Reconditioning of Leviathan. Problems in Repairing the Leviathan. Iron Age, vol. 113, no. 17, Apr. 24, 1924, pp. 1215-1216, 7 figs. partly on p. 1217. How Boston Navy Yard accomplished machining operations of unusual magnitude by special rigging of existing machines.

Refrigerator. The Design and Construction of Refrigerated Ships, L. Williams. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 7, for meeting Nov. 13-14, 12 pp., 16 figs. on supp. plates. See also Mar. News, vol. 11, no. 7, Dec. 1924, pp. 137-141 and 147, and Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 713-719, 14 figs. Features which author considers desirable to incorporate in design and construction of vessel intended to carry perishable cargoes under mechanical refrigeration.

Repair, Foundry Equipment of. Will Make Castings at Sea, A. M. Charlton. Foundry, vol. 52, no. 21, Nov. 15, 1924, pp. 877-880, 4 figs. U. S. S. Medusa has modern equipment for making much of major repair work needed by fleet; two cupolas and four tilting crucible furnaces used; pattern shop also provided.

River Vessels. See RIVER VESSELS.

Route-Recording Instrument. Instrument for Tracing Route of Ships (Le traceur de route ou nautographe, système Baule). Bul. Technique du Bur. Veritas, vol. 6, no. 3, Mar. 1924, pp. 46-48, 4 figs. Describes Baule system and apparatus for automatically and continuously recording movement of ships.

Rudder Manipulation. Rudder Manipulation for Efficient Ship Operation, Elmer A. Sperry. Mar. Eng. & Shipg. Age, vol. 29, no. 1, Jan. 1924, pp. 31-35, 8 figs. Describes gyroscopic roll, pitch, and rudder angle recorder; comparison between hand and gyro pilot steering; improving steering in bad weather.

Rudders. See RUDDERS.

Salvage. See SHIP SALVAGE.

Sea-Depth Recording Machine. New Machine Traces Record of Sea Depths. Mar. Rev., vol. 54, no. 11, Nov. 1924, pp. 431-433, 6 figs. Principle of operation, and construction of machine known as Haynes type, object sought being to secure a continuous sounding beneath bottom of a vessel while traveling at regular rate of speed and in this way do away with outside strandings, and to place indication of this sounding in pilot house at any convenient point so that officer in charge may readily see record of depth through which he is traveling.

Speed Measurement. New Method for Determining Speed of a Ship on a Trial Base (Nouvelle Méthode pour la détermination de la vitesse d'un navire sur les bases), H. Brillié. Génie Civil, vol. 85, no. 14, Oct. 4, 1924, pp. 293-296, 5 figs. Details of method of determining speed on a run length of which is known, ship making two successive trips.

Speeds in Shallow Water. Economical Speeds in Shallow Water, G. Kempf. Shipbldg. & Shipg. Rec., vol. 23, no. 23, June 5, 1924, pp. 671-672,

5 figs. Translation of article in Werft Reederei Hafen, Dec. 7, 1923.

Stability. The Stability of Ships as Concerning the Naval Architect and the Shipmaster, I. C. Commentz. Shipbldr., vol. 31, nos. 167 and 168, July and Aug. 1924, pp. 16-23 and 74-79, 21 figs. Principles governing stability calculations, and application by shipmaster, giving tabular statement of results of stability calculations for important cases of stowage.

Stability Determining Device. Device for Determining Ship's Stability. Nautical Gaz., vol. 106, no. 23, June 7, 1924, pp. 636-637, 1 fig. Description of device which enables degree of stability to be determined when height fo center of gravity of system is known.

Stability Indicators. Some New Instruments for Calculations Relating to Ship Forms, including Transverse and Longitudinal Stability, G. Kempf. Shipbldr., vol. 31, no. 170, Oct. 1924, pp. 185-188, 5 figs. Describes new types of stability indicators. (Abstract.) Translated from German.

Stabilizers. The Gyroscopic Stabilizer (Le stabilisateur gyroscopique, sa détermination), M. Batestini. Bul. Technique du Bureau Veritas, vol. 6, no. 8, Aug. 1924, pp. 152-155. Calculation of stabilizing power of a gyroscope and its application to Sperry gyroscope.

See also GYROSCOPES, Ship Stabilizing.

Towing. See TOWING.

Tugs. See TUGS.

Unloading. Stachelhaus Ship Unloading System (Das Schiffsentladeverfahren Stachelhaus), Teubert. Schiffbau, vol. 25, no. 28, Nov. 19, 1924, pp. 807-810, 4 figs. Details of system designed to avoid losses by more careful handling, by running a belt conveyor length of ship; used especially for briquets.

Ventilation. Ventilating Passenger and Crew Accommodations, W. E. Spofford. Mar. Eng. and Shipg. Age, vol. 29, no. 7, July 1924, pp. 412-417, 6 figs. Factors determining number of air changes necessary and details of ventilating requirements of United States lines.

Vibrations. The Natural Periods of Vibration of Ships, E. H. Rigg. Mar. Eng., vol. 29, no. 5, May 1924, pp. 301-302. Short cut method for determining frequency period of vertical vibration due to bending only.

Wake and Thrust. The Wake and Thrust Deduction of Self-Propelled Single-Screw Models, E. M. Bragg. Soc. Nov. Architects & Mar. Engrs. —Advance Paper, no. 6, for meeting Nov. 13-14, 1924, 6 pp., 8 figs. on supp. plates. Shows to what extent wake of towed models may be used to predict wake of self-propelled models.

The Wake of a Ship in Relation to that of Its Model, F. Kempf. Shipbldg. & Shipg. Rec., vol. 23, no. 7, Feb. 14, 1924, pp. 194-196, 3 figs. Attempt to show how solution of problem of possible maximum difference between wake of ship and that of model is obtained.

Waves Produced by. Theories of the Waves Produced by the Movement of a Ship (Ueber die Theorie der Schiffswellen und des Schiffswellenwiderstandes), E. Hogner. Ingenieur, vol. 39, no. 41, Oct. 11, 1924, pp. 806-807. Discussion of the various theories which have been evolved to explain generation of waves by movement of a ship and to calculate resistance to movement of ships due to existence of such waves.

Wood Cargoes, Measurement. Measurement of Props and Pulpwood. Shipbldg. & Shipg. Rec., vol. 24, no. 24, Dec. 11, 1924, p. 685. A review of the various methods adopted for measurement of wood cargoes. Discusses scale or solid measures, and pile measure.

SHIPYARDS

Accidents in. Accidents in Shipyards. Shipbldg. & Shipg. Rec., vol. 24, no. 10, Sept. 4, 1924, pp. 285-286. Gives summary of recommendations.

Construction Shed. Shipbuilding Shed for Large Ships in the German Shipyards (Deutsche Werft), Hamburg (Die Grosschiffbauhalle der Deutschen Werft in Hamburg), H. Schmuckler. Bautechnik, vol. 2, no. 17, Apr. 18, 1924, pp. 174-178, 12 figs. Details of layout and equipment of largest structure of shipyard.

Electric Drive in. See ELECTRIC DRIVE, Shipyard.

Kiel. The Reconstruction of the Kiel Shipyard of the Deutsche Werke Corpn. (Die Umstellung der Werft Kiel der Deutsche Werke Aktiengesellschaft in baulicher Beziehung), S. Kiehne. Bauingenieur, vol. 5, no. 5, Mar. 15, 1924, pp. 97-102, 7 figs. Describes structural changes made in former German naval shipyard when it was taken over in 1920 by newly formed shipbuilding company.

SHOE INDUSTRY

Management in. See INDUSTRIAL MANAGEMENT, Shoe Factories.

SHOVELS

Diesel-Engine-Driven. Building the Olympic Highway with a Diesel Shovel. Oil Engine Power, vol. 2, no. 5, May 1924, pp. 250-254, 3 figs. Diesel-powered shovel used by contractor of highway in State of Washington handles 600 yards of rocky soil on consumption of 14 gal. of 9-cent fuel.

Mechanical. A New and Novel Shoveloder, D. P. Rohlfing. Salt Lake Min. Rev., vol. 26, no. 18, Dec. 30, 1924, pp. 9-10, 2 figs. A rotary shovel, with only a few moving parts; capacity may be made to suit any requirement; author believes it will shovel material at a much lower installation and operating cost than is possible with any other known loading device.

Power Shovels Save Drudgery of Hand Mucking. Coal Age, vol. 25, no. 8, Feb. 21, 1924, pp. 277-278, 1 fig. Labor scarcity renders mechanical loading necessary; power shovels enable bigger cuts to be pulled and obviate blockholing; specially designed rock cars facilitate tunnel driving.

The Clere Mechanical Shovel. Engineering, vol. 117, no. 3042, Apr. 18, 1924, pp. 495-496, 6 figs., partly on p. 498. Designed for excavation work as rapid and continuous process, to eliminate waste of time in slewing, hoisting, and depositing load which is common to machines of bucket and grab type.

Steam. See STEAM SHOVELS.

Trench Pull. The Northwest Trench Pull Shovel. Engineering, vol. 117, no. 3043, Apr. 25, 1924, pp. 519-520, 2 figs. Shovel manufactured by Northwest Eng. Co., Chicago, which, instead of crowding digger bucket into soil ahead of it, digs following trench, bucket being pulled toward machine instead of thrust away from it.

SIDEWALKS

Elevated. Second Story Sidewalks, J. H. Sawyer. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 87-97, 4 figs. Number of traffic accidents in Loop district of Chicago; separation of pedestrian and street traffic urged as one of the most important measures for relief of traffic congestion, and one of the ways of doing this is to place pedestrians on a different level. Suggested design for elevated sidewalks, together with estimated cost.

Subsidewalks. Sidewalk Subways for Downtown Chicago, T. L. Condron and C. L. Post. West. Soc. Engrs.—Jl., vol. 29, no 3, Mar 1924, pp. 98-101, 3 figs. Placing of sidewalks under ground suggested for relief of traffic conditions in Loop district in Chicago.

SIGNALING

Alarm. See ALARM SIGNALING.

Beacon Lights. See LIGHTING, Beacon.

Mine. See MINE SIGNALING.

Radio. See DIRECTION FINDING; RADIO COMMUNICATION, Signal Measuring; RADIOTELEPHONY, Signaling System.

Shop. See MACHINE SHOPS, Signaling System.

Street. Street Traffic Regulation by Means of Coloured Signals, W. R. Manning. Surveyor & Mun. & County Engr., vol. 16, no. 1694, July 4, 1924, pp. 21-22. Details of traffic signal systems having green lights for right of way in main thoroughfares and yellow lights for intersecting streets. Abstract of paper read before Instn. Municipal & County Engrs.

Submarine. See SUBMARINE SIGNALING.

SILICA

Diatomaceous Earths. Kieselguhr (Le Kieselguhr), C. Ratel. Vie Technique et Industrielle, vol. 5, no. 56, May 1924, pp. 96-99, 2 figs. Discusses kieselguhr, infusorial fossil and other earths; gives analyses, properties, and uses.

Fused. Fused Silica, R. Paget. Nature (Lond.), vol. 113, no. 2847, May 24, pp. 748-752, 6 figs. Early experiments in silica fusion and developments; most important property is said to be its low coefficient of expansion, practical effect of which is demonstrated; physical and optical properties.

The History, Development and Commercial Uses of Fused Silica, R. A. S. Paget. Roy. Soc. Arts—Jl., vol. 72, no. 3724, Apr. 4, 1924, pp. 323-336, and (discussion) 336-339, 14 figs. Development of fused silica and fusing methods; properties and uses.

Pennsylvania. Quarrying Silica in Pennsylvania. Cement, Mill & Quarry, vol. 25, no. 1, July 5, 1924, pp. 31-33. Describes quarrying operations, haulage, relative advantages in quarrying floe and ledge rock.

SILICA BRICK

Grading of. The Grading of Silica Bricks, P. B. Robinson and W. J. Rees. Ceramic Soc.—Trans., vol. 23, part 1, 1924, pp. 1-12, 2 figs. Results of investigation of properties of bricks in "green" state and of burned bricks from same batch, to discover types of grading which resulted from ordinary process of grading as practiced by makers and points essential to production of a mechanically strong, even-textured, sound brick.

Manufacture. Silica Bricks and Wilputte Coke Ovens. Colliery Engr., vol. 1, no. 4, June 1924, pp. 170-189 and 195, 34 figs. Describes silica brick plant of Consett Iron Co. Ltd., at Templeton, and their manufacturing methods; Wilputte ovens installed.

Quicklime and Hydrated Lime Specification. Recommended Specification for Quicklime and Hydrated Lime for the Manufacture of Silica Brick. U. S. Bur. Standards—Circular no. 153, Dec. 27, 1923, 7 pp. Brief description of way in which lime is used in manufacture of silica brick, and general statement as to quality of lime required; directions for sampling and testing.

Resistance. Factors Affecting the Resistance of Silica Refractories to Abrasion, F. A. Harvey and E. N. McGee. Am. Ceramic Soc.—Jl., vol. 7, no. 12, Dec. 1924, pp. 895-906, 4 figs. Resistance to abrasion is tested by grinding a groove in surface of refractory by means of carborundum wheel with suitable mounting; other methods used in tests; factors affecting resistance of silica brick to abrasion are porosity and degree of burn; porosity is affected by grind, quality of ganister, per cent lime and workmanship; relation between length of groove, porosity and burn.

Tests. Investigations of Silica Brick (Untersuchungen über Silikasteine), E. Steinhoff. Stahl u. Eisen, vol. 44, no. 42, Oct. 16, 1924, pp. 1277-1283, 19 figs. partly on supp. plate. Progress of investigations in experimental station of Dortmunder Union; influence of more-or-less complete changes after burning on stability in furnace; suggestions for further research work.

SILICATES

Dehydration. Determination of Temperatures of Dehydration of Silicates (Sur la détermination des températures de départ de l'eau dans les silicates), J. Orcel. Académie des Sciences—Comptes Rendus, vol. 179, no. 20, Nov. 17, 1924, pp. 1056-1059, 1 fig. Describes method employed; temperature-pressure curves indicate whether water is lost gradually, as in case of mechanically retained moisture, or irregularly at certain definite temperatures; method overcomes errors due to oxidation by air which is usually present when other methods are used.

SILICIC ACID

Determination in Ores and Refractories. Critical Investigation of the Determination of Silicic Acid in Ores, Slags and Refractory Materials (Kritische Untersuchung der Bestimmung der Kieselsäure in Erzen, Schlacken, Zuschlägen und feuerfesten Baustoffen), A. Stadeler. Stahl u. Eisen, vol. 44, no. 47, Nov. 20, 1924, pp. 1477-1481. Solubility of silicic acid in hydrochloric acid and water; method of making silicic acid insoluble; experimental results from refractories, slags, ores, and limestone.

SILICON STEEL

Annealing, Effect of. Effect of Annealing on the Magnetic Properties of Sheets of Silicon-Steel Employed in Electrical Construction (Influence du recuit sur les propriétés magnétiques des tôles au silicium employées dans la construction électrique), R. Cazaud. Académie des Sciences—Comptes Rendus des Seances, vol. 178, no. 20, May 12, 1924, pp. 1610-1611. Results of a study of effect of varying conditions of annealing of rolled sheets of steel containing various percentages of silicon, on magnetic permeability, hysteresis losses, reluctivity, and Foucault losses.

Crystals. See CRYSTALS, Silicon-Steel.

Transformer Sheets. See TRANSFORMERS, Silicon Steel in.

SILK

Artificial. Making Artificial Silk by the Cuprammonium Process, L. S. Fryer. Chem. & Met. Eng., vol. 30, no. 19, May 12, 1924, pp. 743-748, 11 figs. Although successfully applied in Europe, method has met with many reverses in United States, due largely to lack of knowledge of its fundamental chemical engineering; details of process and properties of finished product.

Minute Structure of Artificial Silks (Ueber den Feinbau der Kunstseide), R. O. Herzog and H. W. Gonell. Kolloid-Zeit., vol. 35, no. 4, Oct. 1924, pp. 201-202. Contrary to previous impressions, it is now established that all artificial silk fibers, with exception of those of cellulose acetate, show when examined with X-rays the spectro-

graphic diagram of crystalline structure symmetrically disposed.

The Artificial-Silk Industry (L'industrie de la soie artificielle), E. Grandmougin. Génie Civil, vol. 84, nos. 1, 2, and 3, Jan. 5, 12, and 19, pp. 8-10, 33-36, and 57-60, 4 figs. Historical review; examination of four processes, namely, viscose, cellulose-acetate, nitro-cellulose, and cupric ammoniac.

Raw, Cohesion in. Cohesion in Raw Silk, W. P. Seem. Textile World, vol. 65, no. 3, Jan. 19, 1924, pp. 65 and 67. What quality known as cohesion in raw silk consists of and how it is measured; qualities of different silks; emulsion for raw weaving; value of tests to superintendent; consideration of whether it is necessary to consider cohesion in buying thrown silk.

SILLIMANITE. See REFRACTORIES, Artificial Sillimanite.

SILOS

Coal, Reinforced-Concrete. Reinforced Concrete Coal Silos, J. P. Bambach. Coal Trade Jl., vol. 55, no. 43, Oct. 22, 1924, pp. 937-939, 9 figs. Discusses difference between cinder-full and drive-under silo and advantages of more expensive one.

Grain. The Storage of Grain in Mills (Die Lagerung des Getreides in Mühlen), F. Baumgartner. Fördertechnik u. Frachtverkehr, vol. 17, no. 4, Feb. 21, 1924, pp. 48-52, 7 figs. Describes different systems of storing grain and points out advantages of grain silos.

Reinforced-Concrete. Reinforced Silos for Alumina (Tonerdesilo in Eisenbeton für die Innwerk, Bayer. Aluminium A. G. in Töging a. Inn), K. Specker. Beton u. Eisen, vol. 23, no. 21, Nov. 5, 1924, pp. 277-280, 6 figs. Design and construction of silo of Bavarian Aluminum Co.; ground surface 29 by 15 m.; divided into eight main silo cells, 7 by 7 m. and 11 m. in height, with superstructure of storage silo, and dust collection silo.

Reinforcing. See STAVES, Concrete.

Silage Cutters. Testing the Efficiency of Silage Cutters, F. W. Duffee. Agricultural Eng., vol. 5, no. 1, Jan. 1924, pp. 3-6, 2 figs. Tests carried out at University of Wisconsin on efficiency of silo-filling equipment; results show that light-draft machine is more a matter of perfection of design than of type.

SILUMIN. See AIRCRAFT CONSTRUCTION MATERIALS, Light Metals.

SILVER

Alloys. See ALLOYS, Silver.

Casting Methods. Silver Metals or Alloys for Casting, W. J. May. English Mechanics, vol. 99, no. 3069, Jan. 18, 1924, p. 3. Information upon silver alloys and casting methods.

Deposits. See SILVER DEPOSITS.

Metallurgy. See SILVER METALLURGY.

Mines. See SILVER MINES.

Soldering. See SOLDERING, Gold and Silver.

Specific Heat. See METALS, Specific Heats.

Tarnishing and Detarnishing. The Tarnishing and Detarnishing of Silver, G. W. Vinal and G. N. Schramm. Metal Industry (N. Y.), vol. 22, nos. 1, 3, 4, and 6, Jan., Mar., Apr., and June), 1924, pp. 15-17, 110-111, 151-152, and 231-233, 20 figs. Causes of tarnishing and comparison of methods of removal; properties of Moss silver. (Pub. by permission U. S. Bur. Standards.)

SILVER DEPOSITS

Australia. New Silver-Lead Discoveries in Northern Queensland, W. J. Morley. Min. Mag., vol. 30, no. 1, Jan. 1924, pp. 17-24, 5 figs. Particulars of two deposits, the Nightflower near Chillagoe and the Mount Isa near Cloncurry.

The Mount Isa Silver-Lead Field Australia's Newest Find, A. W. Newberry. Eng. & Min. Jl.-Press, vol. 118, no. 5, Aug. 2, 1924, pp. 165-171, 10 figs. Account of visit to Cloncurry district, Queensland, with description of unique cobalt mine near Selwyn.

Canada. Geology of the Mine Workings of Cobalt and South Lorrain Silver Areas, by C. W. Knight, together with description of Milling and Metallurgical Practice in Treatment of Silver Ores at Cobalt, by F. D. Reid, J. J. Denney and R. H. Hutchison. Ontario Dept. Mines, vol. 31, part 2, 1924, 358 pp., 51 figs., partly on supp. plates. Contains also bibliography of milling practice at Cobalt, and review of literature on geology of these areas.

Silver Lead Deposits of Beaver River Area, Yukon, W. E. Cockfield. Can. Dept. Mines—Geol. Survey, no. 2031, summary report, 1923, part A, pp. 22A-28A, 2 figs. Topography; general geology; ore deposits.

South Lorrain Silver District, Ontario, J. M. Bell. Am. Inst. Min. & Met. Engrs.—Trans., no. 1286-M, Jan. 1924, 9 pp., 4 figs., also (abstract) Min. & Metallurgy, vol. 5, no. 205, Jan. 1924, p. 33. History of South Lorrain mining camp and comparisons between local topography and general geology of this camp and that of Cobalt camp; character of silver-bearing veins and their analogy to those of Cobalt, and theory regarding cause of deep seated oxidation in South Lorrain, particularly at Keeley Mine; describes oreshoots, and conditions governing their occurrence and position; mining and metallurgical practice.

Colorado. Observations on the Rich Silver Ores of Aspen, Colorado, E. S. Bastin. U. S. Geol. Survey—Bul., no. 750-C, Sept. 19, 1924, pp. 41-62, 11 figs. Geologic features; mineralogy of ores; primary lead and silver ores; secondary ore minerals; depth of oxidation; descending mine waters.

Transvaal. A Transvaal Silver-Lead Deposit, P. A. Wagner. Economic Geology, vol. 19, no. 7, Nov. 1924, pp. 651-667, 2 figs. Describes deposit situated in Central Transvaal and explains rather remarkable features presented by its oxidized zone, and relation of oxidation to climatic changes.

SILVER METALLURGY

Chloride Blast Roasting and Leaching. Laboratory Tests for Chloride Blast Roasting and Leaching, T. P. Holt. Eng. & Min. Jl.-Press, vol. 117, no. 23, June 7, 1924, pp. 922-925, 5 figs. Describes practice as now followed, method of analysis used, and gives metallurgical notes bearing on adaptability of ores in general to this treatment.

Chloride Volatilization. Silver in Chloride Volatilization, C. M. Bouton, W. C. Riddell and L. H. Duschak. U. S. Bur. Mines—Technical Paper no. 317, 1924, 56 pp., 3 figs. Study of possible causes for low extraction of silver during chloride volatilization. Hydrolysis of silver chloride at high temperatures; behavior of silver compounds on heating; vapor pressure of silver chloride; research on silver silicate; partial vapor pressures of water and of HCl above HCl solutions; volatilization of silver in assaying.

Chlorination. Chlorine, Chlorination and Chlorides, L. Balliet. Salt Lake Min. Rev., vol. 26, no. 2, Apr. 30, 1924, pp. 11-13. Gives notes on old and new processes of chlorination of ores, and points out chemical reactions to show, among other things, what part chlorine and sodium played in genesis of ore deposits.

Cobalt, Canada. See SILVER DEPOSITS, Canada.

Cyanide Mills. Design and Operation of the United Comstock Mill, B. P. Little. Eng. & Min. Jl.-Press, vol. 117, nos. 13 and 14, Mar. 29 and Apr. 5, 1924, pp. 516-522 and 559-564, 12 figs. Construction details of milling plant of United Comstock Mines Co. for treatment of silver ore; how problems of crushing, grinding, and concentration were solved; discusses cyanide treatment, including sand leaching and use of Moore filters.

Ore Treatment. Montesinos on Silver Metallurgy, R. E. Carr. Min. Mag., vol. 31, no. 2, Aug. 1924, pp. 82-87. Account of an old Peruvian treatise by Fernando Montesinos, on occurrence, description, and treatment of silver ores.

Roasting. Causes of Silver Losses in Oxidizing Roasting (Untersuchungen über die Ursachen der Silberverluste bei der oxydierenden Röstung), K. Hessner. Metall u. Erz, vol. 21, no. 24, 2nd Dec. no. 1924, pp. 565-581, 19 figs. Effect of temperature, time, grain size, and thickness of layer on silver losses in oxidizing roasting of argentiferous ores. Bibliography.

SILVER MINES

Arizona. Origin of Certain Rich Silver Ores Near Chloride and Kingman, Arizona, E. S. Bastin. U. S. Geol. Survey—Bul. 750-B, Feb. 23, 1924, pp. 17-39, 11 figs. General features of area; description of the different mines.

British Columbia. The B. C. Silver Mine, V. Dolmage. Can. Min. Jl., vol. 45, no. 30, July 25, 1924, pp. 711-712, 3 figs. Microscopic examination of specimen of exceptionally high grade ore.

Mexico. Pachuca: Home of the Patio Process, B. Burwell. Eng. & Min. Jl.-Press, vol. 118, no. 19, Nov. 8, 1924, pp. 725-730, 10 figs. Worked by Spaniards in 1522, now world's largest producer of silver. Notes on geology and mining.

Nevada. Nevada's Newest Silver Producer—The Betty O'Neal Mine, W. S. Palmer. Eng. & Min. Jl-Press, vol. 117, no. 11, Mar. 15, 1924, pp. 449-452, 3 figs. Description of property, mine surface plant, and mill, including operations.

Tonopah, Nevada's Best-Known Silver District, D. Budelman. Eng. & Min. Jl.-Press, vol. 118, no. 1, July 5, 1924, pp. 5-10, 6 figs. Description of mine, mining methods, and geology.

Ontario, Can. Cobalt: Bonanza Silver District of Ontario, A. A. Cole. Eng. & Min. Jl.-Press, vol. 118, no. 9, Aug. 30, 1924, pp. 325-330, 7 figs. Notes on geology, ores, costs, sampling, concentration, etc. Has averaged two tons of fine silver per day for 20 years.

The South Lorrain Silver Area, C. W. Knight. Ontario Dept. Mines—Bul. no. 48, 1923, 55 pp., 19 figs., partly on supp. plates. Production, geology, and description of properties.

Utah. Tintic, Utah: Active Since 1870, H. E. Havenor. Eng. & Min. Jl.-Press, vol. 117, no. 9, Mar. 1, 1924, pp. 355-361, 10 figs. Is essentially a producer of silver and lead, but contains large amounts of gold and copper and some zinc; is largest silver producing district in United States. Describes operations.

SILVER MINING

Methods. Mining Methods in Mogollon District, New Mexico, S. J. Kidder. Am. Inst. Min. & Met. Engrs.—Trans., no. 1314-M, Mar. 1924, 21 pp., 8 figs.; and (abstract) in Min. & Metallurgy, vol. 5, no. 207, Mar. 1924, pp. 142-143. Application of shrinkage stoping methods, without filling, in mining of large silver-gold orebodies in district where ore is hard and wall rocks stand well without timbering and where veins make little water; vertical and inclined shafts in use with both surface and underground hoisting stations; power generation; transportation.

SILVER PLATING

Carbonates, Action of. Silver Baths and Carbonates. Metal Industry (Lond.), vol. 24, no. 13, Mar. 28, 1924, pp. 325-326. Action of carbonates, prussic acid, barium and calcium cyanide; an efficient decarbonator.

SILVERWARE

Manufacture. Manufacture of Plated Table Silverware (La fabrication des couverts en métal argenté), J. Larde. Arts et Métiers, vol. 77, no. 49, Oct. 1924, pp. 383-386, 4 figs. Discusses alloys used; rolling, and stamping of spoon and fork blanks; etc.

SINE BARS. See GAGES, Sine-Bar.

SIPHONS

Irrigation, Discharge of. Discharge of Irrigation Siphons in California, L. Standish Hall. Eng. News-Rec., vol. 93, no. 26, Dec. 25, 1924, pp. 1024-1025, 1 fig. Tests of 8- to 12-in. asphalt-coated riveted steel pipes under low heads show high friction losses.

Nicholson Thermic. See LOCOMOTIVE BOILERS, Siphons.

Sewerage. Siphon for the Passage of the Tor di Valle Stream Under the Sewers of Rome at the Left of the Tevere River (Il sifone pel passaggio del fosso di Tor di Valle sotto il collettore basso delle fogne di Roma in sinistra del Tevere), G. Corsetti. Annali dei Lavori Pubblici, vol. 62, no. 9, Sept. 1924, pp. 847-855, 9 figs. Details of construction work to give passage to two united torrential streams under sewer to river.

SKYLIGHTS

Crystal-Glass. Luxfer Glass Construction (Luxfer-Glasbau). Bautechnik, vol. 2, no. 40, Sept. 16, 1924, pp. 473-475, 7 figs. Details of glass-reinforced concrete construction by Keppler system for skylights, windows, etc., intensifying natural light by means of glass prisms.

SLAG

Basic, Constitution. The Constitution of Basic Slag, T. P. Colclough. Chem. Age (Lond.), vol. 11, no. 273, Sept. 6, 1924, pp. 18-19, 2 figs. Draws attention to leading part which slag plays in guiding operations of steelmaker; considers constitution of slag, relation between varying slags, and rate of various actions that take place.

Blast-Furnace. Color Classification of Blast Furnace Slags, W. G. Imhoff. Blast Furnace & Steel Plant, vol. 12, nos. 7 and 8, July and Aug. 1924, pp. 310-313 and 362-367, 12 figs. Underlying principles which result in definite slag characteristics.

Constitution of Blast Furnace Slags, R. S. McCaffery. Iron Age, vol. 114, no. 18, Oct. 30, 1924, pp. 1130-1131, 2 figs. Scientific explanation of their constitution based on study at metallurgical laboratory of Univ. of Wis. (Abstract.) Paper read before Am. Iron & Steel Inst.

Electric Conductivity of Fused Slag (La conductibilité électrique des laitiers fondus), F. Farup, W. Fleischer and E. Holtan. Chimie & Industrie, vol. 12, no. 1, July 1924, pp. 11-15, 8 figs. Discusses experiments with binary (silica-lime) and ternary (silica, lime and alumina) slags to determine electra conductivity.

Slag Brick and Other Slag Products, C. E. Ireland. Iron Age, vol. 114, no. 18, Oct. 30, 1924, pp. 1131 and 1179. Treats of blast-furnace slag, development of its manufacture in Birming-

ham, Ala., district, and its uses and adaptability as aggregate in concrete products. (Abstract.) Paper read before Am. Iron. & Steel. Inst.

Slag Sand as Aggregate for Concrete and Reinforced Concrete (Schlackensand als Zuschlagstoff für Beton und Eisenbeton), H. Burchartz. Stahl u. Eisen, vol. 44, no. 23, June 5, 1924, pp. 650-657, 2 figs. Purpose of tests, method of conducting, and results; following conclusions are reached: satisfactory concrete and reinforced concrete can be made from both light and heavy slag sand; concrete from slag sand used in reinforced-concrete structures should be prepared only in thick mixture (such as 1:2:3) which ensures rust-proof covering of the iron. Report on investigation of use of blast-furnace slag for concrete.

Suggestions for the Production and Delivery of Blast-Furnace Slag as Aggregate for Concrete and Reinforced Concrete (Richtlinien für die Herstellung und Lieferung von Hochofenschlacke als Zuschlagstoff für Beton und Eisenbeton). Stahl u. Eisen, vol. 44, no. 21, May 22, 1924, pp. 590-591. Recommendations of committee of German Iron & Steel Inst. for investigation of utility of blast-furnace slag.

The Constitution of Iron Blast Furnace Slags, R. S. McCaffery. Wis. Engr., vol. 29, no. 2, Nov. 1924, pp. 19-21, 5 figs. Based on study of composition, scientific explanation is given of constitution of blast-furnace slags that fits in with known facts.

Brick. See Blast-Furnace.

Cement Mortars and Concretes, Use in. Comparative Tests of Slag With Pittsburgh Sand and Gravel, C. K. Whitehead. Pit & Quarry, vol. 9, no. 2, Oct. 15, 1924, pp. 95-101. Describes tests made of fine and coarse aggregate for cement mortars and concretes, also similar tests made simultaneously with local sands and gravel.

Functions of. On the Working Slags in Ferrous Processes, J. E. Fletcher. Foundry Trade Jl., vol. 29, nos. 404 and 405, May 15 and 22, 1924, pp. 395-398, and 429-430 and 432, 11 figs. Outlines functions of slag in ferrous processes. Mechanism of formation of slags; blast-furnace, cupola, refinery, Bessemer converter, basic Bessemer, open-hearth, basic hearth, and puddling slags.

Lime-Silica, Softening Point. The Influence of Certain Fluxes on the Softening Temperature and Fluidity of a Monosilicate Mixture of Lime and Silica, W. S. Patterson and P. F. Summers. Instn. Min. & Metallurgy—Bul., nos. 233 and 234, Feb. and Mar. 1924, 15 pp. and 7 pp., 5 figs. Work carried out to investigate influence of different bases upon softening point and fluidity of a lime-silica slag.

Products. See Blast-Furnace.

Tests. A Quantitative Laboratory Slag Test, F. H. Norton. Am. Ceramic Soc.—Jl., vol. 7, no. 8, Aug. 1924, pp. 599-602, 4 figs. Describes laboratory test capable of giving quantitatively resistance of refractories to slags.

SLATE

Mining. Technical Progress in Slate Mining, O. Bowles. Eng. & Min. Jl.-Press, vol. 117, no. 15, Apr. 12, 1924, pp. 605-609, 6 figs. Improvement in equipment and methods and in utilization of waste.

Roofing. The Quarrying and Manufacture of Roofing Slates: With Their Characteristics and Tests, M. I. Williams-Ellis. Quarry & Surveyors' & Contractors Jl., no. 328, June 1924, pp. 159-164, 4 figs. Discusses slate in its geolic formation and its composition; classification of slate quarries and slate mines; methods of slate block extraction; making slates from blocks; machinery used; characteristics of No. Wales slate; its properties as roofing material.

SLOTTING MACHINES

Use of. Tooling Reciprocating Machine Tools. Eng. Production, vol. 7, no. 141, June 1924, pp. 166-169, 6 figs. Various methods of extending utility and scope of slotting machines.

SMELTERS

Copper. See COPPER METALLURGY, Smelting.

Enamel. See ENAMELING, Smelters.

SMOKE

Abatement. Atmospheric Pollution and Smoke Abatement in London, Glasgow and Hamburg, J. B. C. Kershaw. Combustion, vol. 11, no. 6, Dec. 1924, pp. 442-444, 2 figs. See also Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 545-546, 2 figs. Facts and figures extracted from report of Committee on Atmospheric Pollution, London, and of Verein für Rauchbekämpfung, Hamburg, relating to progress of smoke-abatement movement in those cities.

Economy through Smoke Abatement. H. B. Meller. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1049-1051. Present-day conditions respecting smoke abatement; results of investigation of smoke and dust problem of Pittsburgh.

Methods of Preventing Smoke in Small Steam Plants, and Cheap Furnaces That Will Do It, O. H. Wood. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 84-87, 4 figs. Human element a factor, also design of furnace, and grates.

Smoke Abatement, H. B. Meller. Combustion, vol. 11, no. 3, Sept. 1924, pp. 217-219. Discusses municipal smoke ordinances, conditions causing smoke, and means of eliminating them.

Smoke Abatement Congress. Times Trade & Eng. Supp., vol. 15, no. 331, Nov. 8, 1924, p. 177. Review of improved systems discusses at conference held in Manchester, Eng.

See also BOILER PLANTS, Smoke-Abatement Equipment.

Air Pollution by, Measurement of. See AIR, Pollution by Smoke.

Analysis. The Analysis of Smoke (Ueber die Analyse von Rauch), H. Salmang. Zeit. für angewandte Chemie, vol. 37, no. 8, Feb. 21, 1924, pp. 97-98, 1 fig. Method of determining solid and liquid components in smoke and fog.

Smoke-Preventing Apparatus. See BOILER FURNACES, Smoke Preventer.

SNOW REMOVAL

Cost and Methods. Methods and Cost of Snow Removal, F. F. Rogers. Mun. & County Eng., vol. 66, no. 1, Jan. 1924, pp. 12-16. Deals with snow removal in Michigan.

Highways. Keeping Trunk Line Highways Open in Winter, E. E. Reed. Eng. & Contracting (Roads & Streets), vol. 61, no. 3, Mar. 5, 1924, pp. 531-534, 3 figs. Organization, methods, and equipment of New Jersey Highway Dept.

Practices. Making Ready for Winter Service, R. E. Plimpton. Bus Transportation, vol. 3, no. 9, Sept. 1924, pp. 415-418, 4 figs. Practices followed by many companies are brought out in nation-wide survey; faster snow removal is demanded; precautions to be taken with motor equipment.

SOAP

Manufacture. Innovations and Progress in the Soap Industry (Neuerungen und Forschritte auf dem Gebiete der Seifenindustrie), E. L. Lederer.

Zeit. für angewandte Chemie, vol. 37, no. 34, Aug. 21, 1924, pp. 637-642. Review of apparatus construction, raw materials, processes of saponification, additions and substitutes, etc.

Technology. Innovations in Germany Soap Technology, E. L. Lederer. Chem. Age (N. Y.), vol. 32, no. 10, Oct. 1924, pp. 419-421. Improvements in apparatus; raw materials; methods of manufacture; addition materials and soap substitutes. (Abstract.) Translated from Zeit. für angewandte Chemie, 1924, p. 637.

SOAPSTONE

Canada. Wabigoon and Trap Lake Soapstone Deposits, Ontario, J. F. Wright. Can. Min. Jl., vol. 45, no. 36, Sept. 5, 1924, pp. 871-872. Geology of Wabigoon Lake basin, geology of soapstone prospects, petrography of soapstone and associated rocks; origin of soapstone and economic possibilities.

SOCIETIES

A.A.A.S. The Organization, Work and Purposes of the American Association for the Advancement of Science, B. E. Livingston. Science, vol. 59, no. 1518, Feb. 1, 1924, pp. 113-119.

SODA

Caustic, Electric Conductivity of. Electric Conductivity of Fused Caustic Soda (Die elektrische Leitfähigkeit von geschmolzenem Atznatron), K. Arndt and G. Ploetz. Zeit. für Physikalische Chemie, vol. 109, June 25, 1924, pp. 237-242, 5 figs. Results of experiments up to 460 deg., using silver crucible with silver disk as inner electrode and high-frequency machine for current.

Caustic, Electrolytic. See ELECTROLYTIC CELLS, Types.

Manufacture. The Electrolytic Caustic Soda and Solvay Processes, P. Parrish. Chem. Age (Lond.), vol. 10, no. 263, and vol. 11, no. 268, June 28 and Aug. 2, 1924, pp. 666-668 and 114-117, 8 figs. June: Reviews efficiency of electrolytic and Solvay processes for production of soda in view of suggested supersession of last named by more recently developed method. Aug.: Details of utilization of by-products.

SODIUM

Salts, Western Canada. Sodium and Magnesium Salts of Western Canada, L. H. Cole. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 100-128, 8 figs. Mode of occurrence; chemical composition; methods of examination; apparatus and methods; deposits of natural sodium sulphate and natural soda; technology and uses of sodium and magnesium salts; drying processes.

SODIUM CYANIDE

Recovery. See COKE MANUFACTURE, By-Product Coke.

SOLDERING

Aluminum. See ALUMINUM, Soldering.

Fluxes for. Fluxes for Soft Soldering, T. B. Crow. Metal Industry (Lond.), vol. 25, no. 10, Sept. 5, 1924, pp. 224-226, 9 figs. Definitions; theory of soldering; experimental work carried out in connection with cleaning and protective properties of various fluxes, efficiency in causing solder to wet surface, efficiencies of tallow and resin as fluxes, influence of flux on surface tension of solder; tests under hydrogen. Contribution to a general discussion on Fluxes and Slags in Metal Melting and Working held by Faraday Soc. and Inst. of Metals with coöperation of British Non-Ferrous Metals Research Assn. and Inst. Brit. Foundrymen.

Gold and Silver. The Soldering and Finishing of Precious Metals. English Mechanics, vol. 98, no. 3067, Jan. 4, 1924, pp. 342-343. Useful information on soldering of gold and silver, and on finishing processes.

SOLIDS

Density, Determination of. The Density of Liquid and Solid Substances (Sur la densité des corps liquides et solides), A. Damiens. Société Chimique de France—Bul., vol. 35-36, no. 4, Apr. 1924, pp. 455-463, 5 figs. Simple and accurate method of determination developed by author; apparatus employed.

Internal Pressures of. The Internal Pressures of Solids, T. W. Richards. Am. Chem. Soc.—Jl., vol. 46, no. 6, June 1924, pp. 1419-1436, 1 fig. Brief analysis of nature of an approximate hyperbolic pressure-volume equation for solids; relation of this hyperbolic equation to an equation of state, in which each of the quantities has definite physical meaning; method which gives a plausible means of calculating internal pressure of isotropic elements from coefficient of expansion by means of a certain equation.

Internal Stresses. See STRESSES, Internal.

Mixing Apparatus. See LIQUIDS, Mixing Apparatus.

Specific Inductive Capacity. Specific Inductive Capacity in Solids (L'état solide envisagé du point de vue électrique: dispersion dans le domaine hertzien), J. Errera. Académie des Sciences—Comptes Rendus, vol. 179, no. 3, July 21, 1924, pp. 155-158, 1 fig. It appears there are two phenomena causing specific inductive capacity to be distinguished: (1) movement of particles (atoms, molecules, ions), determined by applied field, by elastic forces, or by thermal agitation, by inertia of particles and by viscous resistances; and (2) movement of electrons within each particle, producing or modifying state of polarization. Specific inductive capacity falls off, like specific heat, as temperature is reduced.

SOLUTIONS

Foaming Power. Foam Systems (Ueber Schaumsysteme), O. Bartsch. Kolloidchemische Beihefte, vol. 20, no. 1-5, Oct. 15, 1924, pp. 1-49, 5 figs. Foaming power of simple solutions of surface-active substances is greatest in dilute solutions and increases with surface activity of dissolved substance; solutions of maximum foaming power show approximately equal surface tensions; protective colloids prevent formation of aggregates at gas-liquid surfaces and destroy 3-phase foams; their relative effects are roughly proportional to their "gold values."

Gas Law and. Extension of the Gas Law to Superficial Solutions (Extension de l'application de la loi des gaz aux solutions superficielles), A. Marcelin. Académie des Sciences—Comptes Rendus, vol. 179, no. 1, July 7, 1924, pp. 33-35. Results of further experiments on layer of oleic acid on water.

SOOT BLOWERS

Mechanical. Tests of Diamond Soot Blowers, H. H. Norton. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 1, Feb. 1924, pp. 42-54, 13 figs. Results of official tests conducted for purpose of determining efficacy of mechanical soot blowers in cleaning water-tube boiler fired with oil fuel, and to ascertain boiler and furnace efficiencies under certain conditions.

Tests of Mechanical Soot Blowers, R. June. Power, vol. 60, no. 9, Aug. 26, 1924, pp. 326-328, 4 figs. Describes tests made on an oil-fired horizontal water-tube boiler and on 12,000-sq. ft. boilers. They confirm some of the general claims

that have been made from a strictly fuel-saving point of view.

Savings Effected by. Tests Showing Mechanical Soot Blower Savings, R. June. Power House, vol. 17, no. 20, Oct. 20, 1924, pp. 82-84, 4 figs. Data obtained from tests in operating departments of public utility stations, showing fuel economy this type of power-plant equipment effects.

Types. Soot and Soot Blowers. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 29-37, 30 figs. Why soot accumulates on boiler tubes; cost of soot accumulation, methods of removing it and application of various types of soot blowers to different kinds of boilers.

SOUND

Acoustics of Ear. See ACOUSTICS, Ear.

Echo of Ultra-Sounds, Utilization of. Ultra-Sounds and the Utilization of Their Echo (Note sur les ultra-sons et l'utilisation de leur écho). Bul. Technique du Bur. Veritas, vol. 6, no. 2, Feb. 1924, pp. 29-31, 4 figs. Discusses development of apparatus for detection of submarines and mines, making use of echoes of ultra-sounds produced in water; description of apparatus invented by Langevin during war.

Quantitative Testing of. The Quantitative Testing of Sound, C. E. Noël-Storr. Testing, vol. 1, no. 3, Mar. 1924, pp. 227-246, 9 figs. Reviews gradual development of sound testing instruments as applied to engineering. Some of the methods which have been devised and which have proved efficient in practical use.

Recording. Recording of Sounds by Means of a Condenser Microphone (Objektive Klangaufzeichnung mittels des Kondensatormikrophones), F. Trendelenburg. Zeit. für Technische Physik, vol. 5, no. 6, 1924, pp. 236-250, 6 figs. Describes arrangement by means of which sound produced may be recorded and minute structure of these sounds analyzed.

Speech, Nature and Reproduction of. The Nature and Reproduction of Speech Sounds (Vowels), R. Paget. Instn. Elec. Engrs.—Jl., vol. 62, no. 335, Nov. 1924, pp. 963-966, 3 figs. Points out that almost all languages still consist of jumble of voiced and unvoiced sounds, which differ enormously in carrying power; experiments show that in general effect of voicing vowel sound is to increase its carrying power from 10 to 20 times, as compared with range of corresponding whispered or unvoiced sound.

Transmission Systems. See RADIOTELEPHONY, Sound-Transmission Systems.

Velocity in Gases. See GASES, Velocity of Sound in.

Velocity in Sea Water. Velocity of Sound in Sea Water, N. H. Heck and J. H. Service. U. S. Coast & Geodetic Survey—Spec. Pub. no. 108, serial no. 278, 1924, 27 pp., 3 figs. Résumé of existing information on velocity of sound; theory; method of preparing velocity tables; adiabatic corrections to velocity; comparsion of computed velocity with directly measured velocities; sources of error; and applicability of computed velocities to acoustic sounding.

Velocity, Relation to Height. The Relation of Sound Velocity to Height, W. J. Humphreys. Franklin Inst.—Jl., vol. 197, no. 6, June 1924, pp. 821-824, 1 fig. Points out that, in general, velocity of sound in atmosphere decreases 4 meters per sec., roughly, per km. increase of height throughout troposphere, and is nearly constant, through given range of level, witnin stratosphere.

SOUND RANGING

Submarine Ship Detectors. The Fathometer. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 588-589, 3 figs. Describes instrument by which vibrator is set in motion and stopped, return sound to microphone received and corresponding depth, as measured by time interval between these two events, is indicated. Results obtained with demonstration set on S. S. Berkshire.

SOUNDING

Ocean-Depth. Measuring Ocean Depths by Acoustical Methods, H. C. Hayes. Franklin Inst.—Jl., vol. 197, no. 3, Mar. 1924, pp. 323-354, 14 figs. Brief description of different devices and methods for taking depth soundings.

Sounding by Means of Echoes, Behm System (Le sondage par écho, système Behm). Bul. Technique du Bureau Veritas, vol. 6, no. 9, Sept. 1924, pp. 161-165, 6 figs. Describes Behm system of measuring depth of water by means of sound emitted at one side of ship and received on other side as reflected from bottom of ocean.

The Acoustic Method of Depth Sounding for Navigation Purposes. Nature (Lond.), vol. 113, no. 2839, Mar. 29, 1924, pp. 463-465, 3 figs. Account of development, both in Great Britain and abroad, of what is now commonly known as echo method of depth sounding, referring particularly to type of apparatus developed under Admiralty, and results which have been obtained with such apparatus, when used at sea under practical conditions.

See also SUBMARINE SIGNALING.

Recorder. See SHIPS, Sea-Depths Recording Machine.

SPARK GAPS

Ball, Theory of. The Theory of Ball Spark Gaps (Beitrag zur Theorie der Kugelfunkenstrecken), M. Donath. Elektrotechnische Zeit., vol. 45, no. 14, Apr. 3, 1924, pp. 297-300, 6 figs. Determines influence of certain relations of potentials governing the two equally large balls of a spark gap on maximum field intensities and loads of balls; investigation of spark gap connected with two phases of a 3-phase system leads to remarkable new results.

Electrode Temperature. The Effect of Electrode Temperature on the Sparking Voltage of Short Spark Gaps, F. B. Silsbee. U. S. Nat. Advisory Committee for Aeronautics—Report, no. 179, 1923, 10 pp., 4 figs. Investigation shows quite definitely that voltage required to produce spark across short spark gap is appreciably reduced by raising temperature of one electrode.

SPARK PLUGS

Selection and Position. Sparking Plugs, A.C. Burgoine. Automobile Engr., vol. 14, no. 194, Oct. 1924, pp. 301-304, 2 figs. Brief review of present position; standardization; threads and hexagons; reach of plugs; projection; terminals; plug troubles; dual ignition; overoiling of plugs.

SPECIFIC HEAT

Gases. See GASES, Specific Heat.

Liquid and Its Vapor. The Difference of the Specific Heats, at Constant Volume of a Liquid and Its Vapor (Ueber die Differenz der spezifischen Wärmen, bei konstantem Volumen, einer Flüssigkeit und ihres Dampfes), A. Brandt. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 412-414. Shows that specific heat at constant volume consists of two quantities: (a) constant specific heat; (b) varying quantity of heat which on raising temperature 1 deg. cent. is used up in dissociation.

Metals. See METALS, Specific Heats.

Nitrogen and Oxygen. The Ratio of the Specific Heats of Nitrogen and of Oxygen, J. R. Partington and A. B. Howe. Roy. Soc.—Proc.,

vol. 105, no. A730, Feb. 1, 1924, pp. 225-243, 2 figs. Method and results of investigation.

Organic Liquids. The Specific Heats of Certain Organic Liquids at Elevated Temperatures, J. W. Williams and F. Daniels. Am. Chem. Soc.—Jl., vol. 46, no. 4, Apr. 1924, pp. 903-917, 7 figs. Describes adiabatic calorimeter for measuring specific heats of liquids accurately at elevated temperatures; determination of specific heats of 15 liquids over small temperature intervals from 30 to nearly 80 deg.; tabulation of other physical properties of these liquids, related to heat capacity.

SPECIFICATIONS

Asphalt for Roofing. See ROOFS, Asphalt.

Car Wheels. See CAR WHEELS, Specifications.

Cement. See CEMENT, PORTLAND, Specifications.

Centrifugal Pumps. See PUMPS, CENTRIFUGAL, Specifications.

Coal Mines, Rock Dusting. See COAL MINES, Rock Dusting.

Concrete. See CONCRETE, Specifications.

Fuel Oil. See LUBRICANTS, Specifications.

Glass, Glazing. See GLASS, Glazing, Specifications for.

Highways. See HIGHWAYS, Specifications.

Lime. See LIME, Specifications.

Lubricants. See LUBRICANTS, Specifications; Standardization.

Railway Buildings. See RAILWAYS, Buildings.

Railway Motor Cars. See RAILWAY MOTOR CARS, Specifications.

Reinforced Concrete. See CONCRETE, Specifications.

Roofing, Built-up. See ROOFS, Built-up Roofing.

Steel Highway Bridges. See BRIDGES, HIGHWAY, Steel.

Tank Cars. See CARS, TANK, Specifications.

SPECTRA

Arc, between Metals. Arc Spectra between Metals in Different Mediums and in Vacuum (Sur les spectres de l'arc entre métaux, dans différents milieux et dans le vide), St. Procopiu. Annales de Physique, vol. 1 (Series 10), Jan.-Feb. 1924, pp. 89-133, 11 figs. Describes mercury arc in water, illuminating gas, hydrogen, across a Bunsen flame, in vacuum, similarly with zinc and other metals.

Electric Arcs. See ELECTRIC ARC, Spectra.

Hydrogen. See HYDROGEN, Line Spectrum.

Iron. Regularities in the Arc Spectrum of Iron, F. M. Walters, Jr. Jl. Optical Soc. of Am. & Rev. Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 245-274, 1 fig. Theoretical considerations; results of investigation; notes on polyfold levels; gives energy level diagram. (Pub. by permission U. S. Bur. Standards.)

Structure of Iron Spectrum (Die Strukture des Eisenspektrums), O. Laporte. Zeit. für Physik, vol. 23, no. 3-4, Apr. 19, 1924, pp. 135-175, 3 figs. Series of new triplet and quintet terms are completed, and number of iron lines have received interpretation; very complete tables are included.

Measurements. See INTERFEROMETERS.

Spark, Ultra-Violet. See ELEMENTS, Spectra, Ultra-Violet.

Ultra-Violet. Extension of Extreme Ultra-Violet Spectra of Lead, Bismuth, Antimony, and Thallium (Extension des spectres d'étincelle du plomb, du bismuth, de l'antimoine et du thallium dans l'ultraviolet extrême), L. and E. Bloch. Académie des Sciences—Comptes Rendus, vol. 178, no. 5, Jan. 28, 1924, pp. 472-474. Tables are given of 23 new lines for lead, 11 for bismuth, 20 for antimony, and 14 for thallium; certain number of lines appear to be spontaneously reversible, most of which seem to coincide with arc lines found by McLennan; suggests that for the time being such reversibility be used as test for arc lines in this region.

Vanadium. Absorption Spectra of Vanadium, Titanium and Scandium (Die Absorptionsspektren von Vanadium, Titan und Scandium), H. Gieseler and W. Grotrian. Zeit. für Physik, vol. 25, no. 4-6, Aug. 4, 1924, pp. 342-366. Determines absorption lines of vapors of vanadium, tintanium, and scandium at 2000 deg. cent.

X-Ray, Absorption. See X-RAYS, Absorption Spectra.

SPECTROGRAPHS

X-Ray. The Müller X-Ray Spectrograph. Engineering, vol. 117, no. 3028, Jan. 11, 1924, pp. 46-47, 9 figs. Differs from other spectrographs by its wide range of applicability and its extreme compactness; can be utilized for work by several of chief photographic methods now in use.

SPECTROSCOPY

Atomic Structure and. See ATOMS, Structure of.

SPEECH

Frequency Limits of. Frequency Limits of Speech and Music (Der Frequenzbereich von Sprache und Musik), K. W. Wagner. Elektrotechnische Zeit. (special radio no.), 1924, pp. 5-10, 20 figs. Oscillographic investigations disclose character of vowels, consonants, and different musical instruments; ordinary telephones and telephone lines must carry and reproduce faithfully waves up to about 19,000 cycles in order to insure intelligent speech communication; very much wider limits have to be set for good transmission of music, such as, for example, for radio broadcasting of musical programs.

Physics of Hearing and. The Nature of Language, R. L. Jones. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 321-328, 9 figs. Résumé of recent work on physics of speech and hearing.

SPEED INDICATORS

Stroboscopic. The Stroboscopic Speed Indicator. Practical Engr., vol. 67, no. 1874, Jan. 25, 1923, pp. 49-50, 3 figs. Describes Crompton-Roberton stroboscopic vibrator having two similar vibrating bars clamped to base, and electromagnet arranged so that it can set bars in state of vibration.

SPEEDOMETERS

Automobile. The Fitting of the Speedometer and the Arrangement of the Driving Mechanism. Auto-Motor Jl., vol. 29, no. 8, Feb. 21, 1924, pp. 167-168, 8 figs. Latest methods of driving speedometer.

SPHERES

Air Resistance of. See WIND TUNNELS, Resistance of Spheres.

SPINNING

Aluminum, Sheet. See ALUMINUM WARE, Manufacture.

Metals. See METALS, Spinning.

SPRINGS

Air. See AUTOMOBILES, Riding Qualities.

A. S. M. E. Research Report. Preliminary Progress Report of the A. S. M. E. Special Re-

search Committee on Metal Springs. Mech. Eng., vol. 46, no. 11a, Mid-Nov. issue, 1924, pp. 793-795. Deals with present status of spring technique; definitions and historical notes; theoretical aspects; uses and materials of various types of springs; outline of future progress reports.

Annular. Annular Springs (Die Ringfeder, ein neues Maschinenelement), C. Wetzel. Schweizerische Bauzeitung, vol. 84, no. 3, July 19, 1924, pp. 33-35, 3 figs. Describes new machine element, giving examples of its application and table for calculating number of springs for given load.

Characteristics of the Ring Spring, O. R. Wikander. Am. Mach., vol. 60, no. 7, Feb. 14, 1924, pp. 253-254, 2 figs. Recently developed spring; material stressed in pure tension and compression under load; calculations for theoretical pressure; test results in railway work.

Automobile. Making Springs for Motor Vehicles, F. H. Colvin. Am. Mach., vol. 60, no. 14, Apr. 3, 1924, pp. 509-511, 10 figs. Testing steel and finding best heat treatment for it; methods of forming eyes and bending curves; assembling and testing springs for deflection.

Supplementary Air Spring Designed by Great Pianist. Automotive Industries, vol. 50, no. 18, May 1, 1924, p. 958, 1 fig. Supplementary springs of pneumatic type manufactured by Stevens Mfg. Co., Lowell, Mass., and invented by Josef Hofmann; 10,000 of which are said to be in use in Europe.

Coil. Coil Spring Calculations, J. W. Rockefeller, Jr. Machy. (N. Y.), vol. 30, no. 11, July 1924, pp. 874-875, 3 figs., and Machy. (Lond.), vol. 24, no. 618, July 31, 1924, pp. 566-567, 3 figs. Discusses calculation of springs for measuring instruments for valves used in internal-combustion engines; gives chart for design of coil springs of circular-section wire.

Study on Coiled Springs (Une étude sur les ressorts enroulés), D. Landau. Technique Automobile et Aérienne, vol. 15, no. 125, 1924, pp. 47-49, 2 figs. Discusses helical, conical, and spiral springs, and gives formulas for calculating tensile and bending stresses for various cross-sections and a table of coefficients.

Failures. Causes of Spring Failures. Machy. (Lond.), vol. 24, no. 262, Aug. 28, 1924, pp. 698-699, 3 figs., and Machy. (N. Y.), vol. 30, no. 12, Aug. 1924, pp. 965-966, 3 figs. Fatigue as a cause of failure; designing a spring to lift a dead weight; failure due to faulty material.

Heat Treatment. See STEEL, HEAT TREATMENT OF, Dies; Springs.

Helical. Buckling Stress of Helical Springs (Die Knickung von Schraubenfedern), R. Grammel. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 5, Oct. 1924, pp. 384-389, 5 figs. Calculation of helical springs; discusses static bases, buckling load, buckling moment, and danger of buckling in vibration.

Design of Helical Springs, J. W. Rockefeller, Jr. Machy (N. Y.), vol. 31, no. 3, Nov. 1924, pp. 205-206, 3 figs. Deflection; how to calculate spring of varying coil diameter; determining maximum fiber stress.

Leaf. Leaf Springs (Les ressorts à lames), P. Ravigneaux. Technique Automobile et Aérienne, vols. 14 and 15, nos. 122, 123, 124, 125, and 126, 1923 and 1924, pp. 65-74, 111-127, 27-31, 55-63, and 80-84, 66 figs. Discusses elastic fixed springs, their deformation and fatigue; formulas for single and double leaf springs; determination of thickness and number of leaves; spring steels; manufacture of springs; cantilever springs.

Railway and Automotive Leaf Springs, Jos. K. Wood. Am. Mach., vol. 61, no. 19, Nov. 6, 1924, pp. 719-721, 4 figs. Fundamental principles underlying design; leaf springs as beams; springs as shock absorbers; new formulas and their application.

Suspension. Automobile Engr., vol. 14, no. 189, May 1924, pp. 135-140, 30 figs. Recent improvements in laminated springs.

Manufacture. Quality a Vital Factor in Spring Manufacture, H. P. Armson. Can. Machy., vol. 31, no. 25, June 19, 1924, pp. 19-21 and 42, 4 figs. Practice at Hamilton plant of Wallace Barnes Co.; work facilitated by equipment of specialized nature; unusual variety of sizes and materials in industry.

Material, Selection of. How to Select a Spring Material, Jos. K. Wood. Am. Mach., vol. 60, no. 2, Jan. 10, 1924, pp. 49-52. Quantitative method for determining proper spring material; load deflection rate; effect of temperature on modulus of elasticity; maximum safe range of deflection.

Material Testing. What Are the Best Mechanical Tests for Spring Materials? W. Rosenhain. Automotive Industries, vol. 50, no. 6, Feb. 7, 1924, pp. 278-280. Difficult to determine quantitative relation between various qualities such as strength, hardness, resistance to shock, etc.; actual value of test results should be considered; author claims adequate specifications are still lacking.

Railway-Car. Bending, Tensile and Compression Springs for Car Body Support (Biegungs-, Zug- und Druckfedern in bezug auf Fahrzeugabfederung), E. Kreissig. Glasers Annalen, vol. 95, no. 6, Sept. 15, 1924, pp. 114-120, 23 figs. Analyzes stresses occurring in various designs of leaf springs for car body support, and gives brief description of Uerdingen ring spring.

Release of. Effect Produced by the Release of Springs (Les effets produits par la détente d'un ressort), C. Reynal. Arts et Métiers, vol. 77, no. 47, Aug. 1924, pp. 312-317, 6 figs. Discusses rectilinear and curvilinear motion of springs on release, velocity of release, and develops formulas for calculating forces exerted.

Ring. See Annular.

STACKS

[See also CHIMNEYS.]

Glass-Furnace. See GLASS MANUFACTURE, Furnaces.

Locomotive. See LOCOMOTIVES, Stacks.

Reinforced-Concrete. Reinforced-Concrete Stacks of Lupescu System, German Patent 326,196 (Eisenbetonschornstein "System Lupescu" D. R. P. 326-196, erbaut für die Firma Klein, Schanzlin & Becker A.-G., Frankenthal, durch die firma Wayss & Freytag A.-G., Frankfurt, A. Main), A. Koppenhöfer. Bauingenieur, vol. 5, no. 12, June 30, 1924, pp. 368-371, 7 figs. Height 100 m. serving 6 boilers, diameters at bottom 5.9:4.4 m., at top 3.16:2.5 m.; circular foundation 14 m. giving entire satisfaction.

Stacks of Reinforced Concrete (Schornsteine aus Eisenbeton), Chr. Riekhof. Beton u. Eisen, vol. 23, no. 18, Sept. 20, pp. 247-249, 5 figs. Discusses effect of temperature differences between gases and atmosphere, protective linings, calculation of stresses, etc.

STADIUMS

Concrete. See CONCRETE CONSTRUCTION, REINFORCED, Grandstands.

Draining. See DRAINAGE, California Stadium Field.

Nebraska Memorial. Structural Features in the New Stadium, J. G. Mason. Nebraska Blue Print, vol. 23, no. 3, Mar. 1924, pp. 5-7 and 10-11, 1 fig. Analysis of possible loadings on continuous cantilever-ended floor joists, or riser, of Nebraska Memorial Stadium.

Paris. The Colombes Olympic Stadium near Paris (Le stade olympique de Colombes, près de Paris), F. Rod. Génie Civil, vol. 85, no. 6, Aug. 9, 1924, pp. 125-131, 12 figs. Details of design and construction in reinforced concrete, capacity of 60,000, of which 20,000 seats are under cover.

Purdue University. Design Features of the New Ross-Ade Stadium, E. I. Erikson. Purdue Eng. Rev., vol. 20, no. 1, Nov. 1924, pp. 5, 8, and 14, 2 figs., one on cover sheet. Type chosen was U-shaped structure with two straight sides enclosed at north end by half circle.

Wembley and Los Angeles. Stadia, R. L. Morin. Am. Architect & Architectural Rev., vol. 125, no. 2445, May 7, 1924, pp. 427-434, 9 figs. Wembley Park Stadium, Lond., Eng., and Los Angeles Coliseum.

STAIRS

Reinforced-Concrete. See BUILDING CONSTRUCTION, Stairs.

STAIRWAYS

Steps. See CONCRETE CONSTRUCTION, REINFORCED, Stairway Steps.

Stresses. Self-Contained Straight Ashlar Flights of Stairs (Der freitragende, gerade Werkstein-Treppenlauf), H. Friesecke. Bauingenieur, vol. 5, no. 18, Sept. 30, 1924, pp. 578-586, 12 figs. Discusses stresses in stairs and gives details of four extensive tests, conclusions to be drawn from them for propagation of load and approximate calculation, with examples.

STAMPING

Aluminum. See ALUMINUM WARE, Manufacture.

Equipment for. See FORGING, Equipment for.

STANDARDIZATION

Advantages to Industry. Advantages of Standardization to Industry, F. J. Schlink. Mgmt. & Administration, vol. 8, no. 5, Nov. 1924, p. 496. Statement of advantages which accrue to industry by adoption of standards, compiled by Am. Eng. Standards Committee.

Austria. Industrial Standardization in Austria (Die Normung in Oesterreichs Industrie und Gewerbe). Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 3-4, Jan. 25, 1924. Contains introductory article, by J. Tomaides, pp. 23-24, and following articles: Standardization of Building Construction (Baunormung), S. Theiss, pp. 24-25; Standardization in Bridge Building (Normung im Brückenbau), K. Haberkalt, pp. 25-26; Standardization in Sewer Construction (Normung auf dem Gebiete des Kanalisationswesens), W. Voit, pp. 26-27; Standardization of Building Material (Baustoffnormung), O. Stern, pp. 27-28; Standardization of Load Regulations for Buildings (Die Standsicherheitsnormen im Hochbau), R. Saliger, pp. 28-30; Calculation of Buckling Strength of Beams and Girders (Berechnung gedrückter Tragwerksteile mit Rücksicht auf Knickung), pp. 30-34, 16 figs.

See also STANDARDS, Austrian O. N. I. G. Reports.

Automobile Parts. Advantages of Standardization in the Automobile Indutsry (Kraftfahrer und Normung), P. Grodzinski. Allgemeine Automobil-Zeitung, vol. 25, nos. 49 and 49a, Dec. 6 and 10, 1924, pp. 58-60 and 69-70, 7 figs. Points out advantages of standardization of parts, such as tires, pistons and piston rings, valves, spark plugs, wheels and wheel hubs, bodies, etc.; aim and purpose of standardization; comparison of German with American conditions.

Boilers. See BOILERS, STANDARDIZATION.

Bolts and Nuts. See BOLTS, Standardization.

Canada. Engineering Standards Work in Canada in 1924, R. J. Durley. Can. Machy., vol. 32, no. 26, Dec. 25, 1924, pp. 154-156. During year Can. Eng. Standards Assn. issued six new publications; report on gasoline; steel wire strands; concrete and cedar poles; road-construction work; etc.

Cutting-Tool Angles. See CUTTING TOOLS, Standardization.

Electric Insulating Materials. See INSULATING MATERIALS, ELECTRIC, Standardization.

Electrical Machinery. See ELECTRICAL MACHINERY, Standardization.

Germany. An Example of Standardization in German Industry, G. Leifer and H. Goller. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 54-55, 3 figs. Notes on manner in which standardization is practiced in the "Wernerwerk," a Siemens & Halske factory employing 18,000 men and producing electrical machinery, illustrating very close coöperation existing between German industry and the German Industrial Standards Committee (DIN).

Standardization in Germany (Die Normung in Deutschland), F. Neuhaus. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 41, Oct. 11, 1924, pp. 1065-1070, 12 figs. See also Engineering, vol. 118, no. 3056, July 25, 1924, pp. 149-151. Describes in detail inauguration and work of Standards Committee of the German Industry (N. D. I.) of establishing fundamental standards, and refers briefly to several cases of special and international standardization. Paper, abridged, contributed to World Power Conference.

See also STANDARDS, German N. D. I. Reports.

Machine Tools. See MACHINE TOOLS, Standardization.

Methods. Contribution to Methods of Standardization (Beschouwingen over Normalisatiemethodiek), J. Goudriaan, Jr. Ingenieur, vol. 39, no. 3, Jan. 19, 1924, pp. 33-38, 6 figs. Theoretical investigation of most economical steps between successive sizes in series of standardized units. For practical reasons larger steps may be preferable.

Progress, 1923. Engineering and Industrial Standardization. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 230-231. Standardization of bolts and nuts; year's progress in industrial standardization.

Simplification and. Simplification and Standardization, R. M. Hudson. Am. Soc. Steel Treating—Trans., vol. 5, no. 3, Mar. 1924, pp. 276-284. Reviews work of Division of Simplified Practice, Dept. of Commerce, together with many associations, societies, and individual producers, in bringing about standardization of materials produced, as well as effecting reduction in number of types, grades, brands, finishes, and sizes; author brings out that much progress has been made in this work.

STANDARDS

Austrian Oe. N. I. G. Reports. Proposed Standards (Oesterr. Normenausschuss für Industrie und Gewerbe). Sparwirtschaft, nos. 9-10 and 11-12, May and June 1924, pp. 45-51 and 53-60. May: Proposals for earthenware, drain pipes bends, branchings, unions, etc.; single and double wrenches. June: Proposals for hexagonal and square nuts and screws, wing nuts, and spring rings of square and rectangular cross-section.

Report of Austrian Industrial Standards Committee (Oesterr. Normenausschuss für Industrie und Gewerbe). Sparwirtschaft, nos. 13-14, 15-16, 17-18, 19-20, and 21-24, July, Aug., Sept., Oct., and Nov.-Dec., 1924, pp. 61-65, 69, 73 and 76; 81-82; 93; and 105-114 (OeNIG Section), 10 figs. July: Proposed standards regarding classification of iron and steel, asbestos-cement, slate, analysis of

pig iron, and linoleum. Aug.: Drawings, dimensions and data on nut locks, copper rivets and wood screws with square head. Sept.: Proposals for standards for screws for forging onto round bars, turn buckles, belt rivets, belt screws, and graphic symbols for denoting surfaces. Oct.: Proposal for standards for leaf springs and their parts; letter heads for business correspondence. Nov.-Dec.: Proposed standards for testing materials, tensile strength and bending tests, Brinell ball pressure tests and cone pressure tests.

Standard Proposals (Normblattentwürfe). Elektrotechnik u. Maschinenbau, vol. 42, nos. 28 and 30, July 13 and 27, 1924, pp. 449-452 and 472-476. July 13: Details of proposals covering electric machines, rotary current motors, d.c. motors, belt pulleys, etc. July 27: Proposals on electric machinery supplied without bearings, with bracket bearings, horizontal bearing cups, vertical shafts, and motor generators.

Electrical. See ELECTRICAL MACHINERY, Standards.

European. European Engineering Standards Issued in 1923. Am. Mach., vol. 60, no. 15, Apr. 10, 1924, p. 538. List of standards issued during 1923 by European Standardizing bodies, which have been received by Am. Eng. Standards Committee, copies of which can be furnished or which may be consulted at offices of Committee.

German N. D. I. Reports. Report of the German Industrial Standards Committee (NDI-Mitteilungen), vol. 3, no. 8, Jan. 24, 1924, pp. N43-N48, 1 fig. Proposed standard for tangenital grooves; reports on transmission, standardization in boiler design, fits, cutting tools, screws, etc.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 261-268, 5 figs. Proposed standard for rough and semi-finished hexagonal nuts. Changes in standard sheets. Reports of committees on testing methods, iron and steel, railway building materials, bar and section iron, plates and tubes, forged steel, and gears.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 10, Feb. 28, 1924, pp. N57-N66, 15 figs. Proposed standards for unalloyed forged steel. Notes on standardization of tool steel, welding-on plates, etc.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 12, Mar. 27, 1924, pp. 421-428 (N73-N80), 6 figs. Tentative proposals for standards of rolled high-carbon steel—section and bar iron, flat billets, screw and rivet iron; proposed standards for steel castings, flat slide valves, oval valves with flanged ends and socket ends and circular slide valves.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 16, May 22, 1924, pp. N103-N108. Proposals for folding of drawings.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 17, June 12, 1924, pp. N100-N116, 14 figs. Proposals for rope pulleys for lifting machines, pipe threads, screwed pipe couplings, screw caps.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. N117-N122. Proposals for electric traveling cranes of 5 to 100 tons capacity; periodicals and type forms.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 19, July 10, 1924, pp. N123-N130. Square-head screws, parallel measures, screw micrometer, linear measures.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 22, Aug. 28, 1924, pp. N131-N138, 4 figs. Proposals for standards for seamless drawn brass tubes for stuffing boxes, graphic symbols for pipe lines.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol, 3, no. 23, Sept. 11, 1924, pp. 875-880, 6 figs. Details of proposals for screws with conical square head and with point and hexagonal head; size of letters and figures for marking castings, etc.; colors for distinguishing pipe lines; forged flanges for shafts.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 25, Oct. 9, 1924, pp. 963-970, 3 figs. V- and flatted V-threads for bolts and nuts.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 26, Oct. 23, 1924, pp. N163-N165, 6 figs. Proposed standards for cylindrical and angular milling cutters, electric insulator tubes, spools and brackets.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1051-1061, 12 figs. Proposed standards for window envelopes, dead centers, ball joints, milling cutters of various types, cocks without and with stuffing box, and screw-in thermometers.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1107-1110. Proposed standards for paper (material, strength, and use), and microphotographic pictures (magnification, size, etc.).

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 29, Dec. 11, 1924, pp. 1147-1154, 8 figs. Proposed standards for direction of motions on machine tools (lathes, boring and milling machines); units of fits and of accuracy for rolled, forged, pressed or drawn goods; round copper wire for electric purposes; and angle iron with rounded edges.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Maschinenbau, vol. 3, no. 30, Dec. 24, 1924, pp. 1195-1202, 7 figs. Proposed standards for bronzes and red brass, running wheels in disk form and with spokes, light and heavy guide pulleys.

Report of the German Industrial Standards Committee (NDI-Mitteilungen). Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 37-40 (Baunormung), 3 figs. Proposed standards for drain pipe of burned clay, hook eyes for crane hooks, and designations for steels and irons.

German V.D.E. Latest Regulations and Standards of the German Electric Association (Die neuesten Vorschriften und Normen des VDE), A. Molly. Elektrotechnische Zeit., vol. 45, no. 39, Sept. 25, 1924, pp. 1017-1018. Summary of work done at 1924 general meeting at Dresden.

Most Important Changes in German Electric Association Rules on Machines and Transformers (Ueber die wichtigsten Aenderungen der Verbandsbestimmungen, betreffend Maschinen und Transformatoren), G. Dettmar. Elektrotechnische Zeit., vol. 45, no. 39, Sept. 25, 1924, pp. 1018-1021. Developments of VDE regulations for last 23 years and differences of latest regulations compared with previous ones.

Lighting. See LIGHTING, Nomenclature and Standards.

Screw-Thread. See SCREW THREADS, Standards.

STATISTICS

Presentation and Use. Research Based on Masses of Numbers (Grosszahlforschung), K.

Daeves. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Werkstoffausschuss), no. 43, Apr. 16, 1924, 25 pp., 40 figs. Discusses mathematical probability, laws of masses of numbers, frequency and other curves, graphic presentation, and applications in engineering, with examples.

STAVES

Concrete. The Concrete Stave and Its Possibilities, W. G. Kaiser. Cement & Eng. News, vol. 36, no. 2, Feb. 1924, pp. 37-40 and 53, 7 figs. Its prospects discussed at length; how silos are reinforced; results of tests; concrete corn cribs.

STAYBOLTS

Locomotive-Boiler. See LOCOMOTIVE BOILERS, Staybolts.

STEAM

Accumulators. See STEAM ACCUMULATORS.

Binary Cycles Using Mercury and. The Binary Cycles Using Mercury and Steam, A. M. Greene, Jr. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 142-144, 3 figs. It is shown why mercury is a better substance thermodynamically than water at certain points; presents diagrams of temperature and entropy.

Calorimetric Examination. A Calorimetric Method of Surveying the Behavior of Steam, N. S. Osborne. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 88-90, 2 figs. Describes elements of method forming basis of experimental program on properties of steam upon which Bur. of Standards is engaged.

"Critical," Generation of. Experiments on the Generation of "Critical" Steam, J. F. Overwyn. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 693-694, 2 figs. Experiments made in attempt to develop extremely light steam power plant for use in airplanes and other vehicles.

Discharge Computations. Simplifying Steam-Discharge Computations, S. D. Barclay. Power, vol. 60, no. 16, Oct. 14, 1924, pp. 613-614, 5 figs. Presents curves which have proved to be quick and convenient method for finding areas for given discharges or amount of steam discharged for given conditions when area is known.

Dry, Boiler for. See BOILERS, High-Pressure, Dry-Steam Production in.

Engines. See STEAM ENGINES.

Flow of. See FLOW OF STEAM.

Generation. See STEAM GENERATION.

Geothermal. See Natural; Volcanic.

Heat of Vaporization. See EVAPORATION, Heat of.

High-Pressure. Extra-High Pressure Steam. Power Engr., vol. 19, no. 220, July 1924, pp. 247-250, 4 figs. Study of technology and economics of new development in power plant practice, abstracted from Münzinger's recent book.

High-Pressure Steam at the V.D.I. High-Pressure Session (Hochdruckdampf nach dem Stande der Hochdrucktagung des V.D.I.), Berner. Braunkohle, vol. 23, nos. 22 and 24, Aug. 30 and Sept. 13, 1924, pp. 425-430 and 462-466, 16 figs. Articles on properties and application of high-pressure steam (50 atmos. and higher), boiler materials, and boiler construction. Experiences and requirements in practical boiler operation; views on maximum-pressure steam. See also Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 219-220, 1 fig.

Properties and Utilization of High- and Maximum-Pressure Steam (Eigenschaften und Verwertung von Hoch- und Höchstdruckdampf), E. Josse. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 4, Jan. 26, 1924, pp. 65-71, 20 figs. Properties of steam; treatment of maximum-pressure steam in reciprocating engines (Borsig) and steam turbines (de Laval, Brown-Boveri & Cie, Erste Brünner); feedwater heating through tapping steam; utilization of excess flue-gas heat.

Recent Development in the Use of High-Pressure and Superheated Steam, B. N. Broido. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 9, Dec. 1924, pp. 299-330 and (discussion) 331-338, 20 figs. Shows practical difficulties with high pressure and what has been done up to date in order to overcome them; touches on theoretical advantages of high pressure and how it can be applied in practice. See also (abstract) in Combustion, vol. 12, no. 2, Feb. 1925, pp. 120-124, 8 figs.; and Power Plant Eng., vol. 29, no. 2, Jan. 15, 1925, pp. 130-133.

Steam Generation at Extra High Pressures, V. Blomquist. Power, vol. 60, no. 19, Nov. 4, 1924, p. 745, 2 figs. Discusses economy of power generated by back-pressure turbine; improvements in economy which can be produced by bleeding steam for heating feedwater; points out that rotating tube boiler is practical solution of problem of high-pressure steam generation. (Abstract.) Paper presented at World Power Conference.

The Influence of High-Pressure Steam on the Development of Industrial Steam Plants (Der Einfluss des Hochdruckdampfs auf die Entwicklung industrieller Dampfanlagen), Chr. Eberle. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 39, Sept. 27, 1924, pp. 1009-1016, 17 figs. Investigations on influence of heat consumption of steam engine on steam pressure and feedwater temperature show that in condensing engine even with pressure of 30 atmos., influence is very slight, whereas heat consumption of back-pressure engine is favorably affected by initial pressure, even at much higher pressures; points out measures which should be taken for utilizing this advantage of high-pressure steam.

What the Boiler Owner Should Know about High-Pressure Steam (Was soll der Kesselbesitzer über Hochdruckdampf wissen?), L. Schneider. Zeit. des Bayerischen Revisions-Vereins, vol. 28, no. 6, Mar. 31, 1924, pp. 41-44, 7 figs. Discusses properties of high-pressure steam up to 100 atmos., and points out that number of auxiliary arrangements are required for its use; difficulties of its generation, complicated design of plants and frequent lack of economic inducements are some of drawbacks counteracting advantages of high-pressure steam.

Maximum-Pressure. The Technical and Economic Prospects of Maximum-Pressure Steam (Die technischen und wirtschaftlichen Aussichten von Höchstdruckdampf), F. Münzinger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 7, Feb. 16, 1924, pp. 137-146, 16 figs. Calculation of heating surfaces of boiler, superheater, and economizer; generation of maximum-pressure steam; behavior of maximum-pressure boilers in operation; dependence of boiler feedwater on steam pressure; new heat-economic problems.

See also High-Pressure.

Meters. See STEAM METERS.

Natural, Sources and Utilization. Industrial Utilization of Natural Steam (Sur l'utilisation industrielle des manifestations thermiques terrestres), Ginori-Conti. Chimie & Industrie, special no., May 1924, pp. 80-102, 54 figs. Distribution of volcanic-steam regions in the world; geothermal plant at Larderello, Italy; physical researches; temperature and pressure; composition of natural steam; approximate calculation of quantity of steam available; purification of natural steam; other natural-steam sources in Italy, California, Alaska, South America, Japan, and New Zealand.

Physical Properties. Study of the Physical Properties of Steam (Etude sur les propriétés

physiques de la vapeur d'eau), C. Roszak. Chaleur & Industrie, vol. 5, nos. 49, 50, and 52, May, June, and Aug. 1924, pp. 213-223, 283-292, and 402-407, 25 figs. Part I: Saturated steam: determination of heating temperature of water, total heat of saturated steam and of heat of evaporation; specific heats; relation between temperature and pressure of water; volume and specific heat and condensity; conduction. Part II: Superheated steam: specific heat and constant pressure; total and superheated steam; specific volume and characteristic equation. Part III: Discussion of work at University of Munich. Part IV: Determination of heat of vaporization. Part V: Specific heat. Part VI: Relation between temperature and saturation pressure of water. Part VII: Volume and specific weight in saturated water-steam mixture. Part VIII: Conductivity. Part IX: Total heat of superheated steam, Knoblauch-Raisch-Hansen formulas.

Power and Process Work, Use for. Generating Mechanical Energy in Works Using Heating Steam. Sulzer Tech. Rev., no. 1, 1924, pp. 7-14, 10 figs. Advantages of installing steam plant arranged for exhaust or extracted steam utilization in industrial plants; field of application of back-pressure engine; back-pressure engine working in conjunction with another power source; steam-extraction plant; Sulzer oil-operated steam-pressure regulator.

Pressure Equation. Steam Pressure Equation at Low Temperatures (Ueber die Dampfspannungsgleichung bei tiefen Temperaturen), V. Fischer. Zeit. für technische Physik, vol. 5, no. 5, 1924, pp. 187-192. Deduction of equation by means of MacLaurin series.

Pressure Reduction. Steam Pressure Reduction (Dampfdruckminderung), F. Hermenau. Archiv für Wärmewirtschaft, vol. 5, no. 6, June 1924, pp. 107-109, 1 fig. Discusses steam pressure control similar to that of electric current control, reducing or stepping down steam pressure for industrial application, steam supply of large or small capacity combined with large or small range or regularity.

Pressure Regulators. See HEATING, STEAM, Pressure Regulators.

Pressure-Volume-Temperature Relation. M.I.T. Investigates Pressure-Volume-Temperature Relation of Steam, P. W. Swain. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 284-286, 5 figs. Describes apparatus and methods employed at Mass. Inst. Technology for determining volume of water at various temperatures and relation between pressure, temperature, and volume of saturated and superheated steam.

Production, Effect of Sulphur on. The Effect of Sulphur on Steam Production, T. A. Marsh. Combustion, vol. 10, no. 2, Feb. 1924, pp. 123-124. The serious increase in cost of steam due to necessity for combating effect of this element in coal.

Production from Byproduct Producer Gas. Power and Process Steam From Byproduct Producer Gas, C. H. S. Tupholme. Chem. & Met. Eng., vol. 31, no. 8, Aug. 25, 1924, pp. 300-303, 6 figs. Description of a highly efficient combination system evolved for plants using steam in course of production.

Reheating Methods. Possible Methods of Reheating Steam, J. R. McDermet. Power, vol. 60, no. 26, Dec. 23, 1924, pp. 1014-1016. Consideration of all possible methods of reheating, with view to improving conventional methods; points out possibilities and disadvantages of such mediums of heat transfer as radiant energy, heated gas, oil, melted salt mixtures, organic liquids, and mercury vapor.

Research. Progress in Steam Research. Mech. Eng., vol. 46, no. 2, Feb. 1924, pp. 81-87 and 108, 13 figs. Contains following reports in abstract: Report on Progress in Steam Research at the Bureau of Standards, N. S. Osborne and H. F. Stimson; Progress of the M.I.T. Portion of the Steam Investigation, F. G. Keyes; Progress Report on Work at Harvard University on the Joule-Thomson Effect, R. V. Kleinschmidt; Progress Report on the Joule-Thomson Effect, R. V. Kleinschmidt; Progress Report on the Joule-Thomson Effect, H. M. Davis.

Separators. See LOCOMOTIVES, Steam Separators.

Specific Heat. The Specific Heat of Steam, H. L. Callendar. World Power, vol. 1, nos. 5 and 6, May and June 1924, pp. 274-280 and 324-328, 1 fig. May: Explains principles of new methods of research, and illustrates difficulties to be encountered in neighborhood of saturation, which have led to abandonment of many of older methods. June: Rational equation for steam up to its critical point; comparison with experimental results for CO_2.

Storage. See BOILERS, Large-Capacity; STEAM ACCUMULATORS.

Superheated. See SUPERHEATED STEAM.

Tables, Callendar. The Enlarged Callendar Steam Tables, W. M. Selvey. Elec. Times, vol. 66, no. 1725, Nov. 6, 1924, pp. 533-534. Examines a case by means of new tables which, in their new form, are said to be of greatly enhanced value to designers.

Tables, Research for Extension of. See Research.

Thermal vs. Commercial Efficiency. Thermal Versus Commercial Efficiency, W. G. Diman. Power, vol. 60, no. 20, Nov. 11, 1924, pp. 764-765. Points out that solution of troubles does not lie with superpower, nor in all cases with isolated plant; rather, a combination of two with proper consideration given to both power and heating, as well as use of steam for industrial purposes. (Abstract.) Paper read before Nat. Assn. Stationary Engrs.

Volcanic. The Utilisation of Volcanic Steam in Italy. Nature (Lond.), vol. 113, no. 2828, Jan. 12, 1924, pp. 54-55, 3 figs. Efforts made in Italy to utilize natural steam which emerges from earth in volcanic districts for production of power.

See also Natural.

Waste, Utilization of. See WASTE STEAM, Utilization.

Wet. What is Wet Steam? (Was ist nasser Damps?), H. Voges. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 76, no. 31-32, Aug. 8, 1924, pp. 279-280. Discusses damage caused by wet and impure steam in operations and remedial measures for same.

STEAM ACCUMULATORS

Design and Possibilities. The Steam Accumulator, F. Münzinger. Combustion, vol. 10, no. 6, Dec. 1924, pp. 430-435, 11 figs. How load curve of boilers affects capital outlay; load curve and fuel consumption; effect on production; thermal principles on which design of accumulators is based; accumulators in power stations with high steam pressures; relation between steam economy and production.

Ruths. Experiences and Tests of a Ruths Steam Accumulator Plant in Germany (Erste Erfahrungen und Versuche an einer Dr.-Ruths-Speicheranlage in Deutschland), R. Schulze. Wärme- u. Kälte-Technik, vol. 26, no. 16, Aug. 15, 1924, pp. 135-138, 6 figs. Connection and method of operation of Ruths accumulators; insulation and heat losses; accumulator capacity; boiler-plant efficiency with and without accumulators; use of accumulators in factors; development into a heating plant.

First Experience and Trials with a Ruths Steam Accumulator Plant in Germany (Erste Erfahrungen und Versuche an einer Dr. Ruths-Speicheranlage

in Deutschland), R. Schulze. Wärme, vol. 47, nos. 23 and 24, June 6 and 13, 1924, pp. 261-264 and 274-276, 14 figs. Discusses operation of accumulators, heat losses, efficiency of boiler plant with and without accumulator. June 13: Storage capacity, efficiency of boiler plant.

Ruths Accumulators in Dyeing Plants (Die Bedeutung des Ruths-Speichers für Färbereien), W. Christ. Wärme, vol. 47, nos. 46 and 47, Nov. 14 and 21, 1924, pp. 548-550 and 562-566, 18 figs. Details of Ruths accumulator plant and its operation at plant of Textilausrüstungs Co. in Krefeld.

Ruths Accumulators for Steam Storage, A. J. T. Taylor. Can. Engr., vol. 47, no. 26, Dec. 23, 1924, pp. 631-633, 4 figs. Practical method of meeting variation in rate of steam production and consumption. Particularly valuable for pulp and paper, sugar and textile industries, and as standby and peak reducer for hydroelectric installations.

Steam Accumulation, J. Ruths. Engineering, vol. 118, no. 3054, July 11, 1924, pp. 68-69, 3 figs. Equalizing ability of steam boilers of various types as compared with that of accumulators; description of accumulator; special uses of accumulator in power plant, and results obtained in practice. Paper, abridged, contributed to World Power Conference.

Steam Accumulators As a Factor in Power Costs, A. J. T. Taylor. Power House, vol. 17, no. 20, Oct. 20, 1924, pp. 31-34, 5 figs. Describes invention of Johannes Ruths, for storing steam, in use in pulp and paper industry of Sweden, Holland, and other European countries.

Steam Turbine and Steam Accumulator at the Tuborg Works (Tuborgs Fabrikkers nye Dampturbine og Dampakkumulatoranlaeg), T. E. Thomsen. Ingeniören, vol. 33, no. 12, Mar. 22, 1924, pp. 134-143, 9 figs. Describes installation of accumulator of Ruths type, and new turbines; claimed to be a highly economical method of increasing capacity of power station.

Thermotechnical and Practical Advantages of the Ruths Accumulator (Wärme- und betriebswirtschaftliche Vorteile des Ruths-Speichers), C. Bientzle. Glasers Annalen, vol. 94, no. 7, Apr. 1, 1924, pp. 75-80 and (discussion) 80-84, 7 figs. Points out its important influence on production, through saving in time, by shortening of working process, saving in fuel by reduction of cooling-off losses, better control of whole operation, and improvement of quality of products.

Workings of Ruths' Steam Accumulator. Paper, vol. 34, no. 15, July 31, 1924, pp. 662-664, 4 figs. Description of installation of Ruths' steam accumulator in Lessebo sulphite and paper mills, Lessebo, Sweden, showing results obtained by regulating variations in steam pressure and consumption. Translated from article by M. Kreyssig in Wochenblatt für Papierfabrikation.

Types. High-, Medium- and Low-Pressure Accumulators (Der Gefällespeicher für Hoch-, Mittel-, und Niederdruck), C. Hiesselbach. Wärme, vol. 47, no. 17, Apr. 25, 1924, pp. 175-177, 4 figs. Discusses necessary conditions for economic working, describes Ruths and other types, also new type said to fill requirements.

Steam Storage (Dampfspeicherung), H. Herbst. Sparwirtschaft, vol. 1, nos. 21-24, Nov.-Dec. 1924, pp. 103-107 (GW), 8 figs. Discusses Ruths, Rateau, Halpin, Kiesselbach, and other types of steam accumulators, including their application and efficiency.

STEAM-ELECTRIC PLANTS

Coal-Mine. A Modern Colliery Power Plant, E. L. Hann. S. Wales Inst. Engrs.—Proc., vol. 39, no. 5, Jan. 12, 1924, pp. 583-631, 29 figs. partly on supp. plates. Description of power scheme, of Powell Duffryn Steam Coal Co., Ltd., which has been installed in Rhymney Valley for purpose of providing a cheap power supply in such quantity as to enable machine mining to be developed to its fullest extent, and electrical drives to be employed in all cases in which it appears to be economically correct to do so.

Germany. Modern Improvements in Steam Engineering and Its Effect on Electricity Supply (Neuzeitliche Bestrebungen in der Dampftechnik in ihrer Auswirkung auf die öffentliche Elektrizitätsversorgung), H. Gleichmann. Elektro-Journal, vol. 4, no. 10, Oct. 1924, pp. 267-273, 5 figs. Discusses improvements in boiler house, equalizing of boiler performance, use of regenerative process, increase in initial pressure and superheat, use of turbines with high-grade high-pressure parts, systematic and central control, etc.

Mine-Mouth. Electrical Features of Pine Grove Station, C. D. Gray and M. M. Samuels. Elec. Wld., vol. 84, no. 2, July 12, 1924, pp. 56-62, 13 figs. How electrical features of a large steam plant, built at mouth of a mine, remote from load center, differ from those of large city plant. Power house of East Penn Elec. Co., on Swatara Creek at Pine Grove, Pa., used to illustrate the various electrical features involved.

Tests. Tests of a Steam Generating Unit at a Municipal Power Plant, J. E. Woodwell. Power, vol. 60, no. 12, Sept. 16, 1924, pp. 346-450, 24 figs. Results of a series of tests of a complete steam generating unit of Moores Park Station for City of Lansing, conducted jointly by equipment manufacturers, owners and consulting engineer. Principal results are presented graphically and in tabular form.

STEAM ENGINES

Admission and Exhaust in. The Zeuner Valve Diagram, H. Smith. Pacific Mar. Rev., vol. 21, no. 5, May 1924, pp. 269-270, 1 fig. Practical use and solution of Zeuner diagram, a method by which a study of the various conditions governing admission and exhaust of steam can be made, in order to obtain a more thorough knowledge of events which take place inside cylinder. Relation to valve positions and indicator diagram.

Bleeding Type. Engines in Combined Power and Process Steam Plants, J. Cassidy. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 724-725, 1 fig. Describes bleeding-type tandem steam engine developed in England.

The Extraction Steam Engine, T. B. Morley. Power Engr., vol. 19, no. 223, Oct. 1924, pp. 382-385, 4 figs. General principles and modern developments.

Corliss. Erecting a Corliss Engine, G. Edwards. Southern Engr., vol. 40, no. 6, and vol. 41, no. 1, Feb. and Mar. 1924, pp. 49-51 and 54-57, 12 figs. Feb.: Finishing erection and setting valves. Mar.: Final preparations and breaking in the engine.

Cylinder Lubrication. Cylinder Lubrication When Using Saturated and Superheated Steam, J. D. Morgan. Power, vol. 59, no. 16, Apr. 15, 1924, p. 607. Atomization of oil basic requirement in steam-cylinder lubrication; using low flash-point oils; lubrication of special engines.

Cylinders, Heat Transmission in. Heat Transmission in the Cylinders of Reciprocating Engines (Ueber den Wärmeübergang im Zylinder von Kolbenmaschinen), K. F. Herzfeld. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 5, Oct. 1924, pp. 405-411. Discusses heat transmission between gases in motion and solid walls, and makes calculations based on limit layer theory in which a distinction is made between general gas flow and layers at walls.

Development, Line of. See POWER, Development.

Extraction. See Bleeding Type.

Flywheels. See FLYWHEELS.

Governors. Rules for Selecting a Spring Governor (Anleitung zur Wahl eines Feder-Reglers), F. Stiessberger. Praktische Maschinen-Konstrukteur, vol. 57, nos. 17 and 18, May 13 and 20, 1924, pp. 234-236 and 252, 1 fig. Formulas for mathematical calculation.

See also GOVERNORS.

Indicator Diagrams. Study of Indicator Diagrams Made Easy, E. K. Benedek. Power, vol. 60, no. 7, Aug. 12, 1924, pp. 255-256, 6 figs. Discusses construction of characteristic lines and gives simple method of diagram analysis.

Value of Steam-Engine Indicator Diagrams (Wert des Indizierens von Dampfmaschinen). Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 16, 17, and 18, Aug. 31, Sept. 15, and 30, 1924, pp. 143-144, 157-158, and 166-167, 19 figs. Points out necessity of periodical inspection of steam engines with aid of indicator diagrams. Examples of diagrams from different types of engines.

Lubrication. Formation of Residues in Steam Engines and Internal-Combustion Engines and Their Prevention (Die Rückstandsbildung in Heissdampfmaschinen und Verbrennungskraftmaschinen und ihre Verhütung), G. Spettmann. Praktische Maschinen-Kontsrukteur, vol. 57, nos. 21 and 22, June 10 and 17, 1924, pp. 293-294 and 309-310. Discusses formation of residue due mainly to low-grade lubricating oils and advocates use of high-grade oils.

See also LUBRICATION, Prime Movers.

Maintenance. Maintenance and Adjustment of Steam Engines, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 4, Apr. 1924, pp. 166-169, 5 figs. Practical instructions on adjustments, alignment, and general repairs.

Marine. See MARINE ENGINES.

Power Calculation. New Method for Calculating Power of Reciprocating Engines (Méthode nouvelle pour calculer la puissance de la machine à piston), E. Tournier. Académie des Sciences—Comptes rendus des séances, vol. 179, no. 2, July 16, 1924, pp. 101-102. Gives formula for calculating hp. from weight of dry steam, adiabatic drop per unit weight of steam, actual condenser pressure, loss of steam, and maximum efficiency of engine.

Power Plants, Efficient Use in. Steam Engine Utility in Modern Power Plants, A. Murphy. Power House, vol. 17, no. 6, Mar. 20, 1924, pp. 21-24 and 46, 6 figs. Plain slide valve, automatic high speed, Corliss and uniflow types still used efficiently in Canadian field despite hydroelectric development; discussion of different types and how to secure efficiency.

Pumping Engines. See PUMPING ENGINES.

Rolling-Mill. British Rolling Mill Engine Design, Johnstone-Taylor. Iron Age, vol. 113, no. 24, June 12, 1924, pp. 1717-1719, 5 figs. Large and massive engines of marine type with special features; both horizontal and vertical 3-cylinder designs.

See also ROLLING MILLS, Steam-Driven.

Stops, Standardization of. A. I. & S. E. E. General Specifications for Construction and Installation of Automatic Engine Stops. Iron & Steel Engr., vol. 1, no. 3, Mar. 1924, pp. 135-136. Specifications adopted as standard, Sept. 24, 1923, which shall apply to all automatic engine stops of whatever kind or method. See also article, by W. Greenwood, entitled Standardization of Engine Stops, pp. 136-139.

Thermal Efficiency. Standards of Comparison for Steam Engines. Engineer, vol. 138, no. 3599, Dec. 19, 1924, pp. 689-690. Review of discussion at meeting of joint committee on tabulating results of heat engine and boiler trials on suggested improved standard of comparison for thermal efficiency of steam engines.

The Thermal Efficiency of Steam Engines, H. Riall Sankey. Engineering, vol. 118, no. 3076, Dec. 12, 1924, pp. 818-820, 2 figs. Standards of comparison in connection with thermal efficiency.

Triple-Expansion. An Experimental Triple Expansion Engine. Power Engr., vol. 19, no. 222, Sept. 1924, pp. 351-352, 1 fig. Experimental steam engine and accessories which have recently been supplied to Corpn. of City of Cardiff and installed at Technical College, by W. Sisson & Co., Ltd.

Uniflow. Action of Unaflow Engine Governor Eccentrics, W. Turnwald. Power, vol. 59, no. 3, Jan. 15, 1924, pp. 94-96, 8 figs. Effect of excessive lead at light loads; types of governor eccentrics and influence on lead; variation of lead with change in cut-off.

Auxiliary Exhaust Valves Versus Additional Clearance in Back-Pressure Unaflow Engines, P. Langer. Power, vol. 59, no. 24, June 10, 1924, pp. 937-939, 6 figs. States that uniflow engine with normal clearance and exhaust valves will give larger output from given amount of steam at greater economy under all conditions of back pressure than uniflow engine with additional clearance space.

Comparison of Four-Valve and Two-Valve Unaflow Engines, M. L. Barker. Power, vol. 60, no. 8, Aug. 19, 1924, pp. 289-290, 4 figs. Results of tests.

The Carmichael Uniflow Steam Engine. Engineering, vol. 117, no. 3051, June 20, 1924, pp. 808-810, 4 figs. Particulars of engine exhibited at British Empire Exhibition, developing 115 b.hp. at 180 r.p.m.; cylinder has a bore of 15 in. and a stroke of 18 in.; works condensing, a jet condenser being fitted beneath it and air pump being operated from crankshaft.

The Uniflow or Central Exhaust Engine, E. Dickinson. Inst. Mar. Engrs.—Trans., Mar. 1924, pp. 627-642, 11 figs. Principle and important features of engine; consideration of parts.

Valve Gears. See VALVE GEARS.

Valves. See VALVES, Superheated-Steam and High-Pressure.

STEAM GENERATION

Cost. Cost of Generating Steam, E. Winholt. Nat. Engr., vol. 28, no. 3, Mar. 1924, pp. 115-116, 2 figs. Describes simple methods by which records can be kept and costs determined. Simple forms shown for tabulating data and deriving total figures.

United States Practice. Present Practice in Steam Generation in the United States, D. S. Jacobus. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 368-370. Effect of many passes, use of air heaters, relation of efficiency to furnace temperature, etc. Extract of paper read before First World Power Conference, Lond.

STEAM GENERATORS

[See also BOILERS.]

Design Tendencies. Present Tendencies of Steam Generation, Jas. Kemmal. Inst. Mar. Engrs.—Trans., vol. 36, Nov. 1924, pp. 437-447 and (discussion) 447-462, 6 figs. Deals with improvements in boiler construction resulting from adaptation of steam turbines to higher pressures and higher superheats.

Electric. Determination of Hydrogen, C. Dantsizen and E. H. Horstkotte. Paper Trade Jl., vol. 79, no. 24, Dec. 11, 1924, pp. 43-44, 2 figs. Results of test made on a unit rated 5000 kw. 3-phase 60-cycle 6600 volts, operating at 100 lb. gage, installed at plant of Union Bag & Paper

Corpn., Hudson Falls, N. Y., to determine amount of hydrogen liberated in an electric steam generator under actual operating conditions.

Electric Steam Generators, L. G. de Kermor. Eng. Jl., vol. 7, no. 11, Nov. 1924, pp. 673-677, 9 figs. Their development, efficiency, and operating costs; how they solve problem of utilization of surplus and off-peak energy.

Extra-High-Pressure. Steam generation at Extra-High Pressures, V. Blomquist. Engineering, vol. 138, no. 3064, Sept. 19, 1924, pp. 432-433. Economical advantages that may be gained with steam of extra-high pressures. Conditions to be complied with when designing an extra-high-pressure steam generator affording a satisfactory margin of safety. Paper, abridged, contributed to World Power Conference.

High-Pressure. See BOILERS, Bensor High-Pressure.

STEAM METERS

Electric Flowmeter. Installing the Electric Steam-Flow Meter, J. M. Spitzglass. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 746-747, 2 figs. How velocity pressure is obtained; differentiation between close tap and far tap; limitations imposed by bends and elbows; guarding against leaks. (Abstract.) Paper read before Nat. Assn. Stationary Engrs.

Types and Characteristics. Meter Types and Their Characteristics, C. D. Zimmerman. Power Plant Eng., vol. 28, no. 13, July 1, 1924, pp. 696-698. Temperature recorders; instruments for boilers in small boiler plants and power plants; economizer instruments, turbine and miscellaneous instruments; improvements.

STEAM PIPES

Alignment Charts for. Alinement Charts for Piping Problems, L. E. Partch. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1215-1216, 3 figs. Steam velocities and pipe sizes, equivalent areas and boiler efficiencies calculated graphically.

Calculation. Calculation of Steam Piping (Berechnung von Dampfleitungen), Praktische Maschinen-Konstrukteur, vol. 57, no. 10, Mar. 25, 1924, pp. 118-121, 6 figs. Method for determination of pressure and heat losses in steam pipes.

Coverings. See PIPE COVERINGS.

Coverings, Heat Loss Through. Heat Loss Through Insulating Materials, R. H. Heilman. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 742-745, 1 fig. Method for calculating heat loss through pipe covering used for high steam temperatures.

Design of Parts. The Construction of Steam Pipes (Bau von Dampfrohrleitungen), F. Kaiser. Zeit. des Bayerischen Revisions-Vereins, vol. 28, nos. 9, 10, 11, and 12, May 15, 31, June 15, and 30, 1924, pp. 76-79, 85-87, 96-99, and 108-111, 34 figs. Based on practical observations, suggestions are made for selection of construction materials, design of joints, pipe supports, fulcrums, expansion pipes, stop valves, insulators, etc.; general layout of line.

Dimensioning. The Correct Dimensioning of Steam Pipes on the Basis of Heat Economy (Die richtige Bemessung von Dampfrohrleitungen auf Grund der besten Wärme-Oekonomie), A. Sachs. Schweizerische Bauzeitung, vol. 83, no. 18, May 3, 1924, pp. 203-205, 2 figs. Numerical and graphical determination of best pipe diameter in which sum of radiation loss and loss due to pressure drop is a minimum.

Expansion. Compensation of the Linear Expansion of Steam Pipes, H. Menk. Eng. Progress, vol. 5, no. 7, July 1924, pp. 128-138, 8 figs. Discusses heat expansion of long piping; use of compensators between sections of pipe line; flexible compensating pipe; jointed compensation; pipe glands, etc.

Fittings for High Pressures and Temperatures. Piping Materials, Valves and Gaskets for High Pressures and Temperatures, J. D. Morgan. Power, vol. 59, no. 23, June 3, 1924, pp. 907-908. Data on pipe fittings and materials for extremes of pressures and temperatures; relative elasticity of pipe bends; nickel in high-temperature valves; causes of failures of cast-iron fittings.

Fittings, Specifications for. Specifications for Pipe Fittings, H. E. Collins. Mgmt. & Administration, vol. 8, no. 1, July 1924, pp. 83-87, 1 fig. Notes on American standard for flanged fittings; kind and quality; valves. Tables giving dimensions for standard weight fittings and extra-heavy fittings.

Heat Transmission from. See HEAT TRANSMISSION, Problems.

High-Pressure. Calculation of Pressure Piping for Saturated and Superheated Steam (Die Berechnung der Kraftleitungen für Sattdampf und Heissdampf), O. Denecke. Wärme, vol. 47, nos. 39, 40, 41, and 42, Sept. 26, Oct. 3, 10, and 17, 1924, pp. 451-454, 468-469, 484-485, and 494-497, 6 figs. Formulas for calculation; most economic diameter for constant and variable loads; lines with fixed initial pressure and free end pressure; examples of calculation; installation costs.

High-Pressure Steam Line 3,600 Feet in Length, E. E. Scott. Power, vol. 59, no. 6, Feb. 5, 1924, p. 216, 3 figs. Line being successfully operated by Pittsfield (Mass.) Elec. Co. operates at 195 lbs., and carries steam from company's Silver Lake plant to down-town station, where it furnishes energy for operating 750-kw. turbo-generator.

Piping for High Pressure and Temperature, R. A. Fiske. Power Plant Eng., vol. 28, no. 8, Apr. 15, 1924, pp. 424-427, 5 figs. Shows effect of temperature upon tensile strength of 15 to 36-point carbon steel and on wrought-iron pipe; friction losses in superheated lines; pressure drop in fittings; heat transmission through pipe walls; joints for high-pressure steam lines.

Piping Specifications, H. W. Brooks. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 505-506. Gives specifications on high-pressure steam header for Batavia power house of Chicago, Aurora & Elgin Railroad Co., as an example of specifications prepared from purchaser's viewpoint.

Progress in High Pressure Piping Details. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 656-657. Recent tests show effects of expansion stresses in pipe; progress being made in flange-bolt materials and design. (Abstract.) Report of Prime Movers Committee of N. E. L. A.

Insulation. See INSULATORS, Steam-Pipe.

Joints. Pipe Joints for High Pressures and Temperatures. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 396-397, 8 figs. Describes various types.

The Victaulic System of Pipe Jointing. Engineering, vol. 117, no. 3033, Feb. 15, 1924, pp. 205-206, 4 figs. Describes modifications in Victaulic joint since first put on market and its advantageous features, among which are its flexibility.

Losses in. Pressure, Heat and Temperature Loss in Steam Pipe (Druck-, Wärme- und Temperaturverlust in Dampfrohrleitungen), W. Haeder. Kraftmaschine, vol. 21, no. 16, Aug. 25, 1924, pp. 161-164, 2 figs. Formula and tables for saturated and superheated steam; equivalent pipe lengths for valves and bends; heat-transmission coefficient; heat-conduction coefficient; formulas

and tables for bare and covered pipes; efficiency of covering; tables for specific heat.

STEAM POWER PLANTS

[See also STEAM-ELECTRIC PLANTS.]

Ash Handling. See ASH HANDLING.

Automobile Body Plant. Steam Plant of Fisher Body Corporation, C. K. Little. Power, vol. 60, no. 7, Aug. 12, 1924, pp. 240-243, 3 figs. Discusses 30,000 sq. ft. plant of automobile body manufacturer; fuel is mixture of coal and lumber scrap resulting in saving.

Auxiliaries. Energy Supply for Station Auxiliaries, F. M. Billheimer. Elec. World, vol. 83, no. 8, Feb. 23, 1924, pp. 377-380, 10 figs. Reliable service under all operating conditions sought; effect of heat balance and bleeding on layouts; discussion of systems proposed and used.

Power Plant Auxiliaries and Their Relation to Heat Balance, A. L. Penniman, Jr. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 118-121, 1 fig. Points out economy of stage bleeding together with electric drive, and describes use of auxiliary generator connected to and driven by main turbine.

Boiler Furnaces. See BOILER FURNACES.

Boilers. See BOILERS.

Bonus Systems for. Practical Bonus Systems for Power Plants, G. Burgess. Nat. Engr., vol. 28, no. 6, June 1924, pp. 255-258, 4 figs. Outline of bonus system methods for average power plant. Value of a bonus system in increasing interest of operators and efficiency of plant.

British Empire Exhibition. The Power Station of the British Empire Exhibition. Engineering, vol. 117, nos. 3037, 3038, 3039, 3040, 3041, and 3042, Mar. 14, 21, 28, Apr. 4, 11, and 18, 1924, pp. 330-335, 363-364, 387-391, 424-428, 455-458, and 490-491, 72 figs. partly on supp. plates. General arrangement of power station and details of machinery and equipment of engine room and boiler plant. See also Engineer, vol. 137, no. 3558, Mar. 7, 1924, pp. 251-253, 2 figs.

Carolina Power & Light Co. Cape Fear Steam Plant of Carolina Power and Light Co. So. Engr., vol. 41, no. 6, Aug. 1924, pp. 35-42, 16 figs. Describes plant of ultimate capacity of 60,000 kw.; present installation: one 15,000 kw. turbo-generator, three 11,360-sq.-ft. water-tube boilers; pressure, 325 lb.; superheat, 210 to 240 deg. fahr.

Central Stations. See CENTRAL STATIONS.

Coal Handling. See COAL HANDLING, Power Plants.

Coal-Mine. See COAL MINES, Power Plants.

Combined Diesel and Boiler Plant. Oil Engines Practical Even if Process Steam Be Needed, J. S. Le Clercq. Power, vol. 59, no. 9, Feb. 26, 1924, pp. 322-323, 2 figs. Dallas Oil & Refining Co. uses Diesel for power and boilers for process steam; results show considerable saving in power costs.

Combined Heating and Generating. Small Industrial Plant Generates Current at Low Cost. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 754-756, 3 figs. Cincinnati factory of Am. Can Co. used combined heating and generating plant; uniflow engines produce current for less than one cent per kw-hr.; labor reduced to minimum.

Condensers. See CONDENSERS.

Condensing Plants. Thermo-economic Operation of Condensing Plants (Wärmewirtschaftliche Betriebsführung von Kondensationsanlagen), L. Heuser. Wärme, vol. 46, no. 47, Nov. 14, 1924, pp. 537-540, 4 figs. Discusses operating vacuum, thermo-economic measuring instruments, reasons for poor vacuum and remedies, cooling tower question, condensers, air pumps, cooling water heat utilization, etc.

Cooling Towers. See COOLING TOWERS.

Design. Designing a 500-Horsepower Steam Power Plant, C. L. Hubbard. South. Engr., vol. 42, nos. 2, 3, and 4, Oct., Nov., and Dec. 1924, pp. 47-50, 40-43, and 35-39, 8 figs. Design of a steam power plant for an industrial establishment of medium size. Oct.: Determining power requirements, types of motors, prime movers, lighting, ventilating, and elevators and hoists. Nov.: Steam for heating and ventilating, types of prime movers, operating non-condensing and condensing. Dec.: Extraction of bleeder steam turbine as a means of supplying low-pressure steam.

Detroit Lubricator Co. Power Plant of the Detroit Lubricator Company, C. K. Little. Power, vol. 59, no. 9, Feb. 26, 1924, pp. 316-321, 6 figs. New plant has two bent-tube boilers of 2360 sq. ft. of heating surface each, which are on second floor of building, with inside coal storage directly above stokers; details of cooling-water supply; cost of machinery.

Developments. A Résumé of Recent Power-Station Developments, J. H. Lawrence. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 144-145; Brief review of important developments.

Two Score Years in Power Development, F. R. Low. Nat. Engr., vol. 28, no. 10, Oct. 1924, pp. 473-478, 5 figs. Review of developments in power-plant engineering.

Economic Operation. Efficiency in Steam Power Plant Operation, L. M. Arkley. Eng. Jl., vol. 7, no. 10, Oct. 1924, pp. 635-638, 2 figs. Discusses possibility of effecting economy in operation of steam plants; preparations for boiler tests; heat losses; Orsat apparatus; causes of low percentage of CO_2; summary of procedure to ascertain causes of low boiler efficiency; CO_2 recorders.

Economizers. See ECONOMIZERS.

Electrically Driven Auxiliaries. Electrically Driven Auxiliaries for Steam Generating Stations. Nat. Elec. Light Assn.—Serial Report (Elec. Apparatus Committee), publication no. 24-34, Dec. 1924, 132 pp., 95 figs. Operating requirements of auxiliaries both as to speed range and necessity for continuous operation; types of motors and control available for driving these auxiliaries; methods of supplying electric power to these motors. Includes four appendices on application of motor-driven circulating pumps; camparison of methods of driving forced-draft fans; mechanical stokers; and typical motor installation for coal-handling equipment. Bibliography.

Equipment. A Compendium of Modern Power Plant Equipment, Jas. T. Beard, 2nd. Indus. Mgmt. (N. Y.), vol. 68, no. 56, Dec. 1924, pp. 331-335. Defines power apparatus and appliances and shows their relation to cost sheet.

Management in Power Plant Building, F. S. Clark. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 585-588, 7 figs. Methods and equipment at Pittsburgh Plate Glass Co.'s power house at Kokomo.

Savings Produced by Power Equipment, Geo. E. Hagemann. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 627-630. Experience data from typical indstrial plants; notes on steam flow meters; boiler-room meters; oil purifiers.

Equipment, British Empire Exhibition. Power Plant Exhibits at Wembley, J. B. C. Kershaw. Power, vol. 60, nos. 3 and 4, July 15 and 22, 1924, pp. 82-86 and 131-134, 17 figs. Boilers, economizers, air preheaters, dust collectors, deaerators, steam turbines, etc.

Feedwater Heaters. See FEEDWATER HEATERS.

Ford Motor Co. of Canada. See AUTOMOBILE MANUFACTURING PLANTS.

Heat-Head Utilization. The Utilization of Heat Head, A. G. Christie. Power, vol. 60, no. 23, Dec. 2, 1924, pp. 892-893. In case of high pressure and highly superheated steam, heat head may be considered as heat available from adiabatic expansion from initial conditions at superheater outlet down to final exhaust pressure or vacuum; heat head for any conditions can be readily found from Mollier diagram; utilization of continuous blowdown.

High-Pressure. High-Pressure Steam Power Plants Utilizing Waste Steam (Hochdruckdampf-Kraftanlagen mit Abdampfverwertung), F. Langen. Archiv für Wärmewirtschaft, vol. 5, no. 9, Sept. 1924, pp. 165-173, 25 figs. Describes plant of 25 atmos. working pressure with superheating steam and utilizing exhaust steam. Explains proposed completion as a maximum pressure plant.

High Pressure Steam at Weymouth, I. E. Moultrop. Stone & Webster Jl., vol. 35, no. 3, Sept. 1924, pp. 309-317, 3 figs. Description of design and equipment of Weymouth power station of Edison Elec. Illuminating Co. of Boston, highest commercial steam power plant in world.

Layout and Operation of 1200-lb. Steam Plant. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 805-806, 2 figs. Particulars of high-pressure power plant installed at Weymouth power station of Edison Elec. Illuminating Co. of Boston. Steam is initially raised to 1200 lb. and 700 deg. fahr. and used in a 3150-kw. turbine which operates with a 350-lb. back pressure.

Steam at 1,200 Deg. F. in a Unique Power Plant. Power, vol. 60, no. 1, Sept. 9, 1924, pp. 405-406, 1 fig. A turbine for 1200 deg. fahr., 350 lb., supplied by a boiler where fuel and water are intimately mixed, at high combustion efficiency, used for propelling torpedoes. Features suggest possibilities for more economical stationary practice.

High Pressure, Reheating and Regenerating. High Pressure, Reheating, and Regenerating for Steam Power Plants, C. F. Hirschfeld and F. O. Ellenwood. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 179-183 and 225, 14 figs. Authors discuss relative thermal and investment costs involved in modern turbo-generator station, as determined by consideration of steam pressures from 200 to 1200 lb. per sq. in., steam temperatures of 700 and 800 deg. fahr., and six different cycles of operation in which reheating and regenerating are involved in various degrees. (Abridged.)

High Pressure, Superheat, and Reheating in. Pressure, Superheat, Steam Extraction and Reheating as Affecting Power Plant Economy, Eskil Berg. Franklin Inst.—Jl., vol. 197, no. 6, June 1924, pp. 727-739, 8 figs. Notes on gain by high steam pressure; high superheat; gain by high steam pressure and superheat combined; steam extraction; reheating; capacity rating; high pressure and high steam temperature.

High Pressures and Superheats. High Pressures and High Superheats, W. G. Noack. Brown Boveri Rev., vol. 11, nos. 2 and 3, Feb. and Mar. 1924, pp. 23-30 and 54-63, 22 figs. Their evolution and application in steam power plants. Possible improvement of efficiency of ideal steam engine by increasing initial pressure and temperature; regenerative feedwater heating with steam bled from intermediate stages of turbine; turbines for high pressures and superheats; governing; steam generators and accessories for high pressures.

Isolated Plant vs. Centralized Power. Slow-speed Steam Engines for Industrial Purposes, D. S. Capper. World Power, vol. 1, no. 6, June 1924, pp. 353-357, 6 figs. Deals with factors which combine to determine best method of power supply, namely, first cost, working cost, suitability for particular work, liability to stoppage, and insurance risk.

Laundry. A Modern Laundry Power Plant. Power, vol. 59, no. 5, Jan. 29, 1924, pp. 162-164, 3 figs. Describes new plant of Great West. Laundry Co., Chicago, in which problem was to balance power-steam with exhaust-steam requirements for heating laundry water; in boiler-room fuel spreaders and unusual methods of controlling automatically feed of coal and water are features.

Lumber Mills. 18,000-Kw. Plant Serves Lumber Company. Power, vol. 60, no. 17, Oct. 21, 1924, pp. 638-641, 5 figs. Long-Bell Lumber Co. operates its Longview (Washington) properties from its own central plant of 18,000-kw. present capacity; conveyor system delivers hogged fuel to Stirling-type boilers, provided with extension furnaces; ashes are removed by sluicing; electric drive is used extensively throughout plant.

Mercury Vapor-Steam System. Binary Fluid System Using Mercury Vapor Expected to Cut Power Costs, P. M. Heldt. Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 20-21. Gen. Elec. Co. responsible for development of new method which bids fair to result in more economical utilization of fuel; efficiency obtained by recovering some of latent heat.

One New Industrial Power Plant Replaces Seven, C. B. Gorton and F. R. Innes. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 784-791, 16 figs. Electrification of lumber mill of Crossett Lumber Co., of Crossett, Ark., necessitated scrapping 24 old boilers and an old generator. Details of equipment and materials used.

Modern Economical Developments. The Influence of Modern Thermotechnical Development on Power-Plant Design (Der Einfluss der neueren wärmetechnischen Entwicklung auf den Kraftwerksbau), F. Ohlmüller. Elektrotechnische Zeit., vol. 45, no. 17, Apr. 24, 1924, pp. 385-389, 9 figs. It is shown that modern furnace types permit development of larger boiler units, and larger boilers permit savings in cost of installation; position and arrangement of economizer has great bearing on design and costs of boiler houses; the Benson process; design and advantages of multi-cylinder Brünner-type turbines.

Montaup Elec. Co., Mass. Cost Estimate of Montaup Plant Initial Development. Elec. World, vol. 83, no. 10, Mar. 8, 1924, pp. 475-476, 1 fig. One 30,000-kw. unit and three 1500 hp., 400-lb. boilers, giving temperature of 700 deg. fahr., constitute first step.

Oil Refinery. Vacuum Oil Co. Plant at Paulsboro, N. J. Power Plant Eng., vol. 28, no. 12, June 15, 1924, pp. 631-636, 9 figs. All electric power used in refining processes is generated at plant by turbo-generators at potential of 2300 volts; all turbines operate non-condensing against back pressure of about 20 lb.; details of boiler room and furnace design.

Paper Mills. Methods of Operation at the Paterson Parchment Paper Co. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 932-936, 10 figs. Operation of plant is characterized by engineering qualities of high excellence. Describes methods of determining coal consumption, boiler operation, engine equipment, and gives details of maintenance and operation.

New Power Plant of the Bryant Paper Co. Power, vol. 59, no. 19, May 6, 1924, pp. 710-715, 6 figs. Central plant of 8000-kw. ultimate capacity, designed to supply power, steam and hot water to four divisions of large paper mill in Kalamazoo, Mich., replaces combination of individual boiler plants and scattered engine units; special features are balancing of power and heat-

ing steam, special coal- and ash-handling, automatic control and complete metering facilities.

Piping. See STEAM PIPES.

Power, Purchase of. The Purchasing of Power, A. Ulmann, Jr. Power, vol. 60, no. 12, Sept. 16, 1924, pp. 454-456, 2 figs. When to buy power; classification of industries as to whether or no they should purchase power; discusses functions of an operating engineer who finds himself in charge of equipment of a plant operating on purchased power.

Prime Movers for. Prime Movers for Industrial Plants, J. F. Ferguson. Power, vol. 59, no. 20, May 13, 1924, pp. 766-768, 1 fig. Comparison of various types of engines and turbines for use in industrial plants, with summary on economies and relative advantages.

Prime Movers, Progress in. Progress in Prime Movers, Wm. H. Patchell. Engineer, vol. 137, no. 3561, Mar. 28, 1924, pp. 332-334, 3 figs. See also Power Plant Eng., vol. 28, no. 11, June 1, 1924, pp. 611-612. Review of developments and progress in size of units and pressure; direction in which progress points at present, with mention of some limitations. (Abstract.) Address before Instn. Mech. Engrs.

Process Steam. Process Steam as a Power Plant Product, Miles Sampson. Textile World, vol. 65, no. 1, Jan. 5, 1924, pp. 81-82 and 85, 3 figs. Points out that in mill finishing its own goods, process steam may become principal product of power plant; factors in problem of maintaining adequate steam supply at pressures demanded and economically balancing this load with power requirements.

Pulverized Anthracite Slush, Burning. Pulverized Anthracite Slush Burned at Lykens (Pa.). Power, vol. 60, no. 1, July 1, 1924, pp. 2-7, 9 figs. See also Coal Age, vol. 26, no. 8, Aug. 21, 1924, pp. 253-257, 10 figs. One of first power plants to utilize anthracite slush in pulverized form; coal mixed with 75 per cent water pumped 2500 ft. under 400 ft. head and dewatered at plant; boiler plant contains six 5000 and six 6000-sq. ft. water-tube boilers; present generating capacity 6400 kw.

Pulverized Coal in. See PULVERIZED COAL, Boiler Firing; Steam Power Plants.

Railway Shops. C. B. & Q. Builds Model Coal Burning Power Plant. Ry. Elec. Engr., vol. 15, no. 12, Dec. 1924, pp. 413-418, 12 figs. Also Ry. Age, vol. 77, no. 22, Nov. 29, 1924, pp. 989-992, 5 figs. Details of plant for serving needs of new Chicago, Burlington & Quincy shops at Denver; steam generated for shop requirements and for compressing air; electric power is purchased.

Reconstruction of. Rebuilding an Old Steam Engine Plant. Power Plant Eng., vol. 28, no. 14, July 15, 1924, pp. 746-748, 7 figs. Description of plant of Stearns Light & Power Co., Ludington, Mich., which is being rebuilt. Bought steam under contract, used it to generate electric power and then sold steam back to original owners after it had served its purpose.

Sewage-Disposal Works. Power Plant of Milwaukee Sewage Disposal Works. Power, vol. 60, no. 9, Aug. 26, 1924, pp. 316-322, 7 figs. Describes modern plant designed to supply electrical energy, compressed air and heating steam for operation of an activated sewage disposal plant. Steam supply for heating sludge and recovery of heat from purified sewage made interesting problem in design.

Small Industrial Plant. A Model Small Industrial Plant. Power, vol. 60, no. 13, Sept. 23, 1924, pp. 484-486, 3 figs. Describes plant of Froedtert Grain & Malting Co., Milwaukee, Wis., an attractive small plant in which cleanliness is watchword, and tells how remodeling of boiler room at a cost of $35,000 effected a saving of $20,670 a year.

Small, Smoke Abatement in. See SMOKE, Abatement.

Steam Costs. Comparative Analysis of Steam Costs, C. J. Mason. Nat. Engr., vol. 28, no. 3, Mar. 1924, pp. 108-109, 1 fig. How to determine whether privately generated or purchased steam is more economical.

Steam Engines. See STEAM ENGINES.

Steam Turbines. See STEAM TURBINES.

Steel Works. Steel Company Builds New Power Plant. Power Plant Eng., vol. 28, no. 20, Oct. 15, 1924, pp. 1034-1041, 9 figs. Details of power plant of new blast furnace and coke plant of Columbia Steel Corpn. at Provo, Utah; tabular data on equipment used.

Stokers. See STOKERS.

Store Works. Power for the Bridge & Beach Mfg. Co. Power Plant Eng., vol. 28, no. 5, Mar. 1, 1924, pp. 267-271, 8 figs. New power plant of stove manufacturing plant in St. Louis as example of small power-plant construction; steam is generated in three O'Brien, Heine-type boilers equipped with Laclede-Christy chain-grate stokers; electric power is generated by two 440-volt, 3-phase a.c. generators.

Testing, Continuous. Continuous Power-Plant Testing, T. Maynz. Power, vol. 59, nos. 6, 9 and 12, Feb. 5, 26 and Mar. 18, 1924, pp. 205-208, 324-325 and 450-452, 10 figs. Feb. 5: How efficiency of plant can be found each day; examples of necessary log data together with simple process of making calculations. Feb. 29: Checking performance of turbine room. Mar. 18: Making power-plant heat balance.

Tests. Regulations for Efficiency Tests of Steam Power Plants (Regeln für Leistungsversuche an Dampfanlagen), W. Pauer. Archiv für Wärmewirtschaft, vol. 5, no. 11, Nov. 1924, pp. 205-207. Compares proposed German and American (A. S. M. E. 1923) rules for efficiency tests and acceptance tests and offers criticism.

Textile Mill. Modern Power Plant in a Textile Factory. Power Engr., vol. 19, no. 221, Aug. 1924, pp. 296-301, 12 figs. Describes power plant of H. Holdsworth & Co.; plant has uniflow steam engine as its prime mover and steel belts to transmit heaviest drives.

Thermal Efficiency. Power Plant Simplification, H. D. Fisher. Combustion, vol. 10, no. 4, Apr. 1924, pp. 262-264. Deals with question of how far it is practicable or advisable for an industrial power plant to follow trend of central station to obtain greatest possible thermal efficiency.

Waste-Heat Utilization. Choice of Initial State of Steam in Power Plants Utilizing Waste Heat (Ueber die Wahl des Dampf-Anfangszustandes bei Kraftanlagen mit Abwärmeverwertung), Bente. Siemens-Zeit., vol. 4, no. 10, Oct. 1924, pp. 340-344, 10 figs. Discusses use of steam for manufacturing. Determination of initial steam condition for various turbine efficiencies and performances by means of curves starting from waste-steam condition.

Wood-Refuse Burning. New Plant of American Seating Co. Burns Wood Refuse. Power, vol. 59, no. 23, June 3, 1924, pp. 892-897, 8 figs. Model 1500-kw. industrial plant employing condensing turbo-generators with bleeder connections to balance exhaust-steam demands; high-pressure steam supplied to manufacturing departments.

Working Costs. Working Costs in Small Power Plants, T. E. Love. Instn. Engrs. (India)—Jl., vol. 4, Apr. 1924, pp. 160-168, 3 charts on supp. plates. Deals with capital charges which include depreciation and interest on capital expenditure;

and running charges which include cost of fuel, lubricating oil, water supply, labor and stores and repairs.

STEAM ROLLERS

Design. Technical Viewpoints in Steam Roller Construction (Maschinentechnische Gesichtspunkte bei Dampfstrassenwalzen), W. Voight. Bautechnik, vol. 2, nos. 30 and 31, July 11 and 18, 1924, pp. 340-342 and 347-348, 5 figs. Discusses developments leading to modern types with road breaker attached.

STEAM SEPARATORS. See LOCOMOTIVES, Steam Separators.

STEAM SHOVELS

Superheater. Superheated Steam Shovel, H. B. Oatley. Min. Congress Jl., vol. 10, no. 4, Apr. 1924, pp. 176-177. Discusses value of application of superheater process applied to steam shovel.

Tunnel Mucking by. Tunnel Mucking Performed by Power Shovels for the First Time. Contract Rec., vol. 38, no. 44, Oct. 29, 1924, pp. 1070-1072, 7 figs. Unusual use for steam shovels demonstrated by tunnel project put through by Niagara Power Co. of Niagara Falls, viz., driving 36-ft. diameter tunnel, 4300 ft. long, through solid rock. Entire clean-up was handled by five specially prepared shovels.

STEAM TRAPS

Applications. Principles and Applications of Modern Steam Traps, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 28, no. 2, Feb. 1924, pp. 56-58, 2 figs. Factors to be considered in selection of a steam trap for a given purpose; classification and applications of different types with suggestions for their installation and operation.

Design and Use. Design and Use of Steam Traps (Konstruktion und Verwendung der Wasserableiter), A. Gramberg. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 39, Sept. 27, 1924, pp. 1037-1040, 9 figs. Discusses details of commercial types and their effectiveness in combination with regulation of heat supply; proper installation.

Testing. Traps Should Be Tested for Heat Loss, G. E. Gaster. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 942-943, 1 fig. Method of determining weight of water passing through trap and steam used.

Types. Steam Traps of Various Makes and Their Operation. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 51-63, 29 figs. Describes briefly some designs, together with something regarding manner in which they perform their work.

STEAM TURBINES

Acceptance Tests. Acceptance Tests of Steam Turbines (Abnahmeversuche an Dampfturbinen), H. Rollwagen. Archiv für Wärmewirtschaft, vol. 5, no. 6, June 1924, pp. 101-106, 5 figs. Results of tests of 22 types of various kinds; comparison between ideal efficiency based on steam properties and real efficiency based on measurements on generator; advantage of electric drive for condenser pumps.

Assembling Runners. Assembling 15,000-Horsepower Impulse-Turbine Runners, Ralph Brown. Power, vol. 59, no. 22, May 27, 1924, pp. 867-868, 3 figs. Methods employed in assembling rotor spiders for 22,222-kva. generator.

Auxiliaries, Electrically Operated. Improving Steam Turbine Operations, J. M. Drabelle. Power Plant Eng., vol. 28, no. 9, May 1, 1924, pp. 478-480, 7 figs. Steam turbine with electrically operated auxiliaries at Boone Station is reputed to have high economy.

Motor Drives for Turbine Auxiliaries, H. W. Smith. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 807-810, 5 figs. Modern practice in application and control of motors for auxiliary drives.

Back-Pressure. Performance Tests on a Back-Pressure Turbine in a German Sugar Refinery (Leistungsversuche an einer Gegendruckturbine der ersten Brünner Maschinenfabriks-Gesellschaft in der Nestomitzer Zuckerraffinerie in Nestomitz a. E.), E. Josse and A. Stodola. Zeit. des Vereines deutscher Ingenieure, vol. 67,, no. 52, Dec. 29, 1923, pp. 1163-1168, 1 fig. Describes notable improvement in design of high-pressure turbines; results of tests on turbine built by Brünner Maschinenfabriks Gesellschaft show efficiency of 85 per cent.

The Back Pressure Process and Its Application in Steam Turbines (Das Gegendruckverfahren und seine Anwendung bei der Dampfturbine), G. Zerkowitz. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 7, 39, and 42, Feb. 16, Sept. 27, and Oct. 18, 1924, pp. 147-152, 11 figs.; 1026-1030, 10 figs.; and 1093-1096, 6 figs. Feb. 16: Thermotechnical principles; general formulas are derived for evaluation of back-pressure and supply engines, especially for steam turbines; investigation of back pressure and initial pressure; back-pressure installation in connection with a Ruths steam accumulator. Sept. 27: New types of back-pressure turbines. Oct. 18: Back-pressure process as regenerative process; examples of new plants, making use of regenerative process.

Bearings. See BEARINGS, Steam-Turbine, Remetalled, Boring of.

Blading. Corrosion and Erosion of Steam Turbine Blading, E. Honegger. Brown Boveri Rev., vol. 11, no. 12, Dec. 1924, pp. 263-268, 7 figs. Deals with question of blade wear separately in high-pressure and low-pressure portions of turbine.

Steam Turbine Blading. Power, vol. 59, nos. 6, 7, 8, and 9, Feb. 5, 12, 19, and 26, 1924, pp. 200-204, 11 figs.; 251-254, 9 figs.; 293-296, 6 figs.; and 329-330, 2 figs. Describes commercial turbine blading, telling how to distinguish impulse from reaction types, why some impulse blades are unsymmetrical and what general conditions govern blading materials; different types of blading, and recent improvements.

Steam Turbines, F. Hodgkinson. Power, vol. 60, no. 14, Sept. 30, 1924, pp. 533-535, 2 figs. Discusses high-and low-pressure blading and a novel means intended to free turbine from part of water in low-pressure region. Abstract of paper read at World Power Conference, Lond.

See also DeLaval; Impulse Blades and Nozzles; Jet Action on Blading; STEEL, HEAT TREATMENT OF, Turbine Blading.

Bleeder. Industrial Use of the Bleeder Turbine, Claude C. Brown. Power Plant Eng., vol. 28, no. 22, Nov. 15, 1924, pp. 1134-1135, 3 figs. Bleeder capacity is main consideration; power is by-product, but efficiency is important.

Steam Extraction or Pass-out Steam Turbines, W. S. Burge and J. P. Chittenden. Engineer, vol. 138, no. 3599, Dec. 19, 1924, pp. 702-704, 8 figs. Outline of method of obtaining steam-consumption curves for pass-out turbine; how main admission valve and low-pressure or pass-through valves must operate to fulfill requirements of pass-out turbine under actual running conditions; types of control gear. (Abstract.) Paper read before Instn. Mech. Engrs.

Brown-Boveri. See High-Pressure.

Brünner. Brünner High-Pressure Turbine Shows Improved Economy. Power, vol. 60, no. 13, Sept.

23, 1924, pp. 498-500, 4 figs. Steam velocities below those of usual practice are among refinements contributing to an efficiency, when noncondensing, comparable with uniflow engine.

Brush-Ljungström. Brush-Ljungström Turbines. Elecn., vol. 93, no. 2427, Nov. 21, 1924, pp. 582-583, 3 figs. Their manufacture at Loughborough, England; how economy in time and labor is obtained.

Brush-Ljungström Turbines at a Cement Works. Power Engr., vol. 19, no. 222, Sept. 1924, pp. 331-345, 23 figs. Describes lay out of power plant erected at Rhoose works at Aberthaw & Bristol Channel Portland Cement Co. Ltd.; detailed information as to equipment; describes turbine plant.

5,000-Kw. Brush-Ljungström Turbine at the British Empire Exhibition. Engineering, vol. 118, no. 3054, July 11, 1924, p. 71, 4 figs. Particulars of 5,000-kw. machine exhibited by Brush Elec. Eng. Co., Ltd., Loughborough, and notes on its advantages.

The Manufacture of the Brush-Ljungström Turbine. Engineering, vol. 118, no. 3073, Nov. 21, 1924, pp. 699-700, 7 figs., partly on supp. plate. Description of new shop and machinery.

Characteristic Curves. Characteristic Curves of Steam Turbines, J. Y. Dahlstrand. Power Plant Eng., vol. 28, no. 15, Aug. 1, 1924, pp. 797-799, 7 figs. Understanding of fundamentals and factory test curves will enable one to figure effects of changed operating conditions.

Checking Condition. Maintaining Impulse-Turbine Efficiency by Checking the Condition Curve, Rob. R. Walden. Power, vol. 59, no. 21, May 20, 1924, pp. 823-825, 2 figs. Various stage pressures at normal load indicate if turbine is in efficient state, or whether internal damage or undue wear will alter these from normal.

Control, Hydraulic Relay for. Turbine Controlled by Temperature or Pressure. Power Plant Eng., vol. 28, no. 2, Jan. 15, 1924, pp. 162-163, 2 figs. Describes hydraulic relay device which will transmit impulses from thermostat or pressure diagram to distance and at same time magnify power of these impulses so that they will control turbine governor with positiveness.

Cross-Compound. Cross-Compound Impulse Turbine Geared to 4,000-kw. D.-C. Generator. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 360-362, 3 figs. Describes De Laval units installed for auxiliary drive in Trenton Channel Plant of Detroit Edison Co.; each unit contains two d.-c. generators operating in parallel at 250 volts, capable of delivering 4000 kw. at normal load and 6000 at maximum. Reduction gears used between turbine and generator, and principle is developed so as to include both high- and low-pressure turbines, driving a common gear through individual pinions. Advantages thus obtained.

50,000 Kw. Compound Parsons Turbine for the Crawford Avenue Station, Chas. Parsons. Power, vol. 60, no. 19, Nov. 4, 1924, pp. 728-730, 3 figs. Unit, recently completed in England and shipped to Chicago, contains three turbine elements and three generators; thermal efficiency of 27.8 per cent from coal to steam is expected. (Abstract.) Paper presented at World Power Conference.

The Cross-Compound Turbine Adaptable to a Variety of Conditions, E. H. Thompson. Power, vol. 60, no. 2, July 8, 1924, pp. 50-51, 1 fig. Applications of cross-compound principle indicate a growing appreciation of desirable characteristics of this type. Consideration of such units of today brings to light a number of ways in which this construction may be utilized and suggests an increasingly important field in future.

De Laval. Blading Effects in a De Laval Turbine, D. S. Anderson. Instn. Mech. Engrs.—Proc., no. 4, July 1924, pp. 687-702, 8 figs. Results of nozzle tests to determine efficiency; preliminary survey of tests; tests to determine relative angle of outlet; final analysis of steam tests.

See also Cross-Compound; High-Pressure.

Design. Modern Large Steam Turbines. Power, vol. 59, no. 14, Apr. 1, 1924, pp. 543-544, 5 figs. Abstract of lecture delivered by L. Helander before Providence Eng. Soc., Jan. 4, 1924, in which he described conditions governing design and operation of large steam turbines.

Steam Turbines and Condensing Equipment, F. Hodgkinson. Elec. Jl., vol. 21, nos. 11 and 12, Nov. and Dec. 1924, pp. 505-513 and 548-559, 27 figs. Nov.: Developments and present tendencies; modern types. Dec.: Blading and blade fastening; blade materials; balancing; turbine costs; condensers and auxiliaries. (Abstract.) Paper presented before World Power Conference.

Tendencies in Steam Turbine Construction. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1183-1186, 5 figs. Trouble is not anticipated with operating pressures as high as 1200 lb.; temperatures will not go above 850 deg. fahr.

Development, Lines of. See POWER, Developments.

Developments. Developments in Steam-Turbine Field, E. H. Brown. Power, vol. 59, no. 25, June 17, 1924, pp. 989-992, 2 figs. Steam turbine from its inception in 1884, with particular reference to recent developments in American and European practice, such as general application of stage heating, use of high pressures with resuperheating, and improvements designed to give high efficiency at moderate peripheral velocities for rotating parts.

Evolution of Steam Turbines (L'évolution de la turbine à vapeur), C. Monteil. Technique Moderne, vol. 16, nos. 14 and 16, July 15 and Aug. 15, 1924, pp. 469-474 and 533-541, 22 figs. July 15: Discusses reaction in hydraulics and in steam turbines, Brown-Boveri-Parsons turbines; stages of speed and multiple turbine wheels, etc. Aug. 15: Discusses adaptability of steam turbines for high pressures, power factors, difficulties of last wheel; describes 40,000 kw. turbines of 1500 r.p.m., 12,000 to 15,000 kw. of 3000 r.p.m.; application of low-power turbines, use of high pressures and high superheating.

Steam-Turbine Development Influenced by Higher Pressures and Reheating. Power, vol. 59, no. 1, Jan. 1, 1924, pp. 9-11, 4 figs. Review of developments; house turbines; small steam turbines; condenser development.

The Modern Steam Turbine on Land and Sea, C. A. Parsons. Power House, vol. 17, no. 16, Aug. 20, 1924, pp. 25-29, 4 figs. Turbo-electric generating units now being built up to 60,000 kw.; thermal efficiency over all, coal to electricity, of 27.80 per cent expected in recent installations; mechanical gearing, reheating steam, etc. Abstract of paper read at World Power Conference, Eng.

The Steam Turbine, C. A. Parsons. Engineering, vol. 138, no. 3065, Sept. 26, 1924, pp. 469-470. Correlates certain well-known principles of thermodynamics with practical progress of steam turbine and with important advances that are being made at present time.

Diaphragm Blades. Making Steam Turbine Diaphragm Blades. Iron Age, vol. 114, no. 17, Oct. 23, 1924, pp. 1047-1051, 10 figs. Steel-foundry practice at Schenectady works of Gen. Elec. Co.; novel planer fixture permits planing at several angles with one clamping; centrifugal babbitting of large bearings; unusual radius tool.

Disks, Protection from Axial Vibration. The Protection of Steam Turbine Disk Wheels From

Axial Vibration, W. Campbell. Gen. Elec. Rev., vol. 27, nos. 6, 7, and 8, June, July, and Aug. 1924, pp. 352-360, 459-484, and 511-535, 99 figs. See also (abstract) Power, vol. 60, no. 3, July 15, 1924, pp. 94-99, 13 figs. June: Troubles which gave rise to investigation made by Gen. Elec. Co., and preliminary work which led to discovery of cause of difficulty. July: Nature and theory of vibration in turbine wheels, and reasons for necessity of placing reliance on actual tests in addition to purely analytical methods. Aug.: Methods of design and testing for protection of turbine bucket wheels from axial vibration.

Extra-High-Pressure. Extra High-Pressure Steam Turbines, V. Nordström. Engineering, vol. 118, no. 3057, Aug. 1, 1924, pp. 178-179. Discusses recent developments to obtain better utilization of working power of steam by means of increased steam pressure, contemplating 30 kg. per sq. cm. and even 50 to 100 kg. per sq. cm., also activity of De Laval Co. Abstract of paper of World Power Conference.

Extraction. See Bleeder.

Foundations. Checking Foundations for Large Turbines. Power, vol. 69, no. 4, Jan. 22, 1924, pp. 135-137, 2 figs. Discusses requirements for foundations for Westinghouse turbines, as well as inspections before installing unit, such as ordinarily devolve upon service engineer in charge of erecting work.

Steam Turbine Foundations (Dampfturbinen-Fundamente), E. Rausch. Bauingenieur, vol. 5, no. 23, Dec. 10, 1924, pp. 772-775, 3 figs. Explains action of forces and especially dynamic effects, and gives new rules for foundation work of a lighter type.

Geared. Geared Turbines of the English Electric Company. Engineering, vol. 118, nos. 3073 and 3075, Nov. 21 and Dec. 5, 1924, pp. 698-699 and 760-763, 14 figs. partly on supp. plate. Discusses factors upon which efficiency depends, and describes geared turbines of Eng. Elec. Co.

High-Pressure. High-pressure Turbines. Engineer, vol. 137, no. 3566, May 2, 1924, pp. 489-490, 5 figs. Special turbines developed by Brown, Boveri & Co.

High Pressures and High Superheats in Modern Steam-Power Plant Practice, W. G. Noack. Mech. Eng., vol. 46, no. 1, Jan. 1924, pp. 40-42, 5 figs. Describes Brown-Boveri turbine for high-pressure steam, which consists of high-pressure or series turbine, and low-pressure turbine designed for ordinary steam pressures. Translated from pamphlet published by Brown, Boveri & Cie, Baden, Switzerland.

New High Pressure Turbine. Pac. Mar. Rev., vol. 21, no. 7, July 1924, pp. 384-385, 5 figs. Describes new velocity stage turbine developed by DeLaval Steam Turbine Co., Trenton, N. J., especially adapted to modern practice in high-pressure, high-temperature steam.

Steam Turbines at Very High Pressure (Les machines à vapeur à très haute pression), A. Troller. Nature (Paris), no. 2618, June 7, 1924, pp. 364-368, 5 figs. Discusses Gennevilliers 45,000-hp. equipment, Brown Boveri high-pressure turbines and data, Blomquist boilers, etc.

Steam Turbines for High Pressures, C. F. Stork. Engineering, vol. 118, no. 3054, July 11, 1924, pp. 69-70, 1 fig. Details of design and construction of high pressure steam turbine made by Erste Brünner Maschinenfabrik on principle that heat consumption can be improved mainly by increasing heat drop in area of high pressure and by building very economical turbine for this area. Abstract of paper read before World Power Conference.

What the World Power Conference Showed About Modern Steam Turbines and Their Design. Elec. Wld., vol. 84, no. 14, Oct. 4, 1924, pp. 737-740. Abstracts of four authoritative papers on high pressure showing general lines of development in Great Britain, Holland, Sweden, and United States.

See also Brünner; Extra High Pressure.

High Pressure, Superheat, and Vacuum. The Effect of High Pressure, Superheat and Vacuum on the Efficiency of Large Turbines, C. Sylvester. Elec. Times, vol. 65, no. 1692, Mar. 20, 1924, pp. 327-328, 3 figs. Effects above-mentioned are illustrated by diagrams.

High Pressures and Temperatures. Tendencies in Steam Turbine Plant, Eskil Berg. Power Plant Eng., vol. 28, no. 11, June 1, 1924, pp. 592-594, 8 figs. High pressures and temperatures; stage extraction and reheating.

Improvements. Improvements in Steam-Turbine Construction (Neuerungen im Dampfturbinenbau), R. Palm. Glückauf, vol. 60, no. 9, Mar. 1, 1924, pp. 152-156, 3 figs. Comparison of different turbine types and discussion of new possible applications; details of recent improvements in turbine and auxiliary machines, and most important improvements in condenser plants.

Improving Efficiency of. Steam Turbines, C. Parsons. Engineer, vol. 138, no. 3579, Aug. 1, 1924, pp. 140-142, 4 figs. Describes four methods of improving thermal efficiency of thermodynamic cycle without going to higher maximum temperature, and their application in turbine plant of 50,000-kw. power station to be erected at Crawford Avenue, Chicago, now nearing completion at Newcastle-on-Tyne. Abstract of paper read at World Power Conference.

Impulse. Stage Efficiencies of Impulse Turbines, L. J. Levit. Power, vol. 60, no. 21, Nov. 18, 1924, pp. 809-810, 4 figs. Manner of plotting condition curve so that pressures to be expected in impulse turbine might be roughly determined.

Impulse Blades and Nozzles. The Proportioning of Impulse Blades and Nozzles, G. Stoney. Engineering, vol. 118, no. 3066, Oct. 3, 1924, p. 473, 3 figs. Consideration of effect of each factor involved in proportioning of blades and nozzles, and investigation of influence that error in assumed values of these factors has on final results.

Isolated Plants. Applications of Steam Turbines for Isolated Plants, C. L. Hubbard. Nat. Engr., vol. 28, no. 1, Jan. 1924, pp. 14-17, 7 figs. Description of the different types of steam turbines and their operating principles; camparative advantages of turbines and reciprocating engines; comparative performance of engines and turbines; factors to be considered in selection of a prime mover.

Jet Action in Blading. A Note on Jet Action in Turbine Blading, Wm. Kerr. Instn. Mech. Engrs.—Proc., no. 4, July 1924, pp. 673-686, 6 figs. Deals only with special aspect of problem, arising out of certain peculiar results obtained in investigation on outlet jet directions from blading of single-row wheel while stationary and using different kinds of nozzles.

Limiting Vacuum, Determination of. Determining the Leaving Loss and Limiting Vacuum of a Steam Turbine, B. C. Sprague. Power, vol. 60, no. 25, Dec. 16, 1924, pp. 976-977, 2 figs. Points out that economical turbine operation depends to large extent on supplying degree of vacuum conducive to best overall plant efficiency.

Locomotives with. See LOCOMOTIVES, Steam-Turbine.

Lubricating-Oil Consumption. Consumption of Lubricating Oil on Turbines, W. O. Andrews. S. African Instn. Engrs.—Jl., vol. 22, no. 7, Feb. 1924, pp. 103-107, 1 fig. Summary of investiga-

tion and its practical bearing on economical use of oil for turbine lubrication; results were obtained on 31 turbo-generators and turbo-compressors ranging from 3000 to 12,000 kw.

Lubricating Oils for. See LUBRICATING OILS, Steam-Turbine.

Lubrication. Correct Lubrication for the Steam Turbine, C. C. Brown. Power Plant Eng., vol. 28, no. 6, Mar. 15, 1924, pp. 323-325. Operating methods, causes for breaking down of oil, and specifications for suitable oils are discussed.

Improving the Lubrication System of Steam Turbines, C. C. Brown. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 420-422, 1 fig. Describes oil troubles, their causes in steam turbines, and how application of a cooling coil and a slow reciprocating steam pump eliminated them from a continuous filtration system.

Turbine Lubrication, N. E. Funk. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1080-1084, 4 figs. Discusses difficulties experienced in applying many lubricating oils that are considered by refiners to be high-grade products; problems of turbine lubrication; action of oil as heat-dissipating agent; destruction of oil in operation; effects produced by destructive agents; care of lubricant in service.

See also LUBRICATION, Prime Movers.

Marine. See MARINE STEAM TURBINES.

Metropolitan-Vickers. Recent Developments in Large Turbine Practice. World Power, vol. 1, no. 4, Apr. 1924, pp. 243-248, 6 figs. Improvements in design and construction introduced by Metropolitan-Vickers Elec. Co., tending to reduce steam consumption to minimum.

Mixed-Pressure. Mixed-Pressure Turbine versus a New Steam Plant, F. S. Yontsey. Power, vol. 59, no. 24, June 10, 1924, pp. 934-936, 3 figs. To supply power to new mine 4½ mi. distant, mixed-pressure turbine in home plant was selected in preference to steam plant at new mine or additional high-pressure capacity in original plant; salient features are condenser and cooling-water installations.

Nozzle-Loss Analysis. Turbine Nozzle Loss Analyzed by Air-Flow Measurement. Power, vol. 60, no. 23, Dec. 2, 1924, pp. 875-877, 7 figs. Wind tunnel is utilized in principle for investigating suitability of turbine nozzles, valves, buckets, or other parts for transmitting steam efficiency.

Nozzle Regulator. An Automatic Nozzle Regulator for Steam Turbines. Eng. Progress, vol. 5, no. 3, Mar. 1924, pp. 54-55, 3 figs. Consists of number of double-beat drop valves, controlled by one common spindle; each single valve controls steam admission to nozzle, or group of nozzles, of first stage; made by Bergmann Elec. Works, Berlin.

Nozzles. See NOZZLES, Steam, Design of.

Operation. Operating Instructions for Large Turbines. Power, vol. 59, no. 13, Mar. 25, 1924, pp. 490-491. Rules of procedure in starting up and getting turbine under way; taken from instructions of Westinghouse Elec. & Mfg. Co.

The Control of Power Production, Chas. L. Hubbard. Factory, vol. 32, no. 1, Jan. 1924, pp. 27-29, 64, 66, 68 and 70, 23 figs. Principles of steam-turbine operation.

See also Design.

Parsons. Steam Turbines, C. A. Parsons. Engineering, vol. 118, no. 3054, July 11, 1924, pp. 63-67, 4 figs. Describes 50,000 kw. turbine plant for Crawford Ave. Power Station, Chicago, Ill. embodying principles of increased feedwater temperature, increased boiler pressure, reheating of steam after partial expansion and increased vacuum and means to utilize it efficiently. Abstract of paper read before World Power Conference.

See also Cross-Compound.

Parsons Line. Is the Parsons Line Straight or Curved? C. F. Merriam. Power, vol. 60, no. 1, July 1, 1924, pp. 8-10, 4 figs. Shows fallacy of assuming that Parsons line is necessarily straight.

Pass-Out. See Bleeder.

Performance Determination. Turbine Performance from Steam-Quality Measurements, N. L. Johnson. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 691-692, 1 fig. Points out that Thomas meter makes it possible to extend determination of turbine performance by measurements of steam quality to cases where exhaust steam is wet.

Periodic Examination. Periodic Examinations of Steam Turbines. Power, vol. 59, no. 15, Apr. 8, 1924, pp. 562-563. Instructions of Westinghouse Elec. & Mfg. Co. on details which should be critically observed in periodic examinations.

Pressure and Velocity. Relation of Pressure and Velocity in Various Types of Steam Turbines, F. P. Hodgkinson. Power, vol. 59, no. 12, Mar. 18, 1924, pp. 444-445, 3 figs. Describes variation in steam pressures and velocity for various types of turbine stages.

Radial-Flow. How the Radial-Flow Turbine Compares with the Axial-Flow Type. Power, vol. 59, no. 2, Jan. 8, 1924, pp. 50-53, 4 figs. It is shown that radial-flow turbine in double rotation is equivalent to single-rotation turbine of double speed.

Reaction. Largest Straight Reaction Turbine—How Internal Conditions Vary with Load, E. H. Thompson. Power, vol. 59, no. 26, June 24, 1924, pp. 1016-1019, 6 figs. Turbine of Brooklyn Edison Co.'s Hudson Ave. station contains no impulse velocity wheel and is entirely a reaction type; it is served by largest surface condenser so far constructed; conical cylinder bores give improved efficiency.

Rotors, Balancing. See BALANCING, Turbine Rotors.

60,000-Kw. Sixty Thousand Kilowatt General Electric Turbine for Commonwealth Edison Co. Power, vol. 60, no. 4, July 22, 1924, pp. 151-152, 3 figs. Particulars of unit being built by Gen. Elec. Co. for Crawford Ave. station of Commonwealth Edison Co., of Chicago. Is a cross-compound assembly, being made up of a high-pressure turbo-generator and a low-pressure turbo-generator into which high-pressure exhaust enters after being resuperheated.

Small-Plant. Application of Turbines to Small Plants, A. Iddles. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1186-1190, 6 figs. Use of high pressures and regenerative cycles; combinations of various types possible in industrial plants.

Steam-Air Drive for Motorship Auxiliaries. Steam-Air Turbines for Auxiliary-Engine Drive, Especially on Motorships (Dampf-Luft-Turbinen für Hilfsmaschinenantrieb, insbesondere auf Motorschiffen), M. Melan. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 2, Jan. 12, 1924, p. 28, 1 fig. Deals with drive of auxiliary engines on motor tank ships; steam, air, and steam-air drive; tests at Kiel shipyard of the Deutsche Werke on reciprocating engines and turbines; graphic reproduction of results with steam-air turbines; conclusions.

Steam-Flow Calculation. Calculating Steam Flow for Turbines, J. Y. Dahlstrand. Power Plant Eng., vol. 28, no. 18, Sept. 15, 1924, pp. 945-946, 1 fig. Method by which steam consumption of a turbine may be calculated.

Stork-Erste-Brünner. The Stork-Erste-Brünner Steam Turbine (La turbine à vapeur système

"Stork-Erste Brünner"), D. C. Tiekink. Revue Universelle des Mines, vol. 4, no. 6, Dec. 15, 1924, pp. 302-314, 9 figs. Discusses steam consumption, improving curve of steam consumption as a function of load, safety in operation and application in new turbine.

Tests. Tests of a 7,000-Kw. Steam Turbine Generator at the Bristol Electricity Works. Engineering, vol. 118, no. 3060, Aug. 22, 1924, pp. 253-255, 6 figs. Report of exhaustive tests of a 7,000-kw. machine at Bristol, Eng., which have been carried out by Metropolitan-Vickers Elec. Co., Ltd., Manchester; main object of test was to establish by actual figures real efficiency of multiple exhaust arrangement, which is now embodied in all large turbines constructed by firm in question.

Tests on a Richardsons, Westgarth and Co.'s Steam Turbine. Engineering, vol. 118, no. 3072, Nov. 14, 1924, pp. 668-669. Particulars of tests carried out, periods extending over three years.

Types and Selection. The Control of Power Production, Chas. L. Hubbard. Factory, vol. 32, no. 2, Feb. 1924, pp. 166-169, 204, 206, and 208, 18 figs. Types of steam turbines and their selection.

Wheels, Bucket Wear in. Bucket Wear in Modern Steam Turbine Wheels, R. M. Norstrom. Nat. Engr., vol. 28, no. 5, May 1924, pp. 214-215, 6 figs. Factors in design and construction of modern steam turbines affecting wear and efficiency of buckets. Relative advantages of pressure-stage versus velocity-stage turbines in this respect.

STEEL

Abrasion, Resistance to. Brinell's Researches on the Resistance of Iron, Steel and Some Other Materials to Wear, H. A. Holz. Testing, vol. 1, no. 2, Feb. 1924, pp. 104-146, 21 figs. Review of researches and test data, largely based upon translation of Brinell's original paper in Swedish.

Alloy. See ALLOY STEELS.

Annealed Carbon, Strength of. Elastic Limit and Resistance of Annealed Mild Steels in Combined Elongation and Torsion Test (Limite élastique et résistance des aciers doux recruits dans le cas d'efforts combinés de traction et de torsion), M. Seigle and M. Cretin. Académie des Sciences —Comptes rendus des séances, vol. 179, no. 4, July 28, 1924, pp. 253-256. Experiments with circular bars of 2.5 mm. cross-section for elastic and permanent deformation by elongation and torsion to establish curves of deformation.

Arsenic Penetration, Effect of. Some Effects of the Penetration of Arsenic and Sulphur into Steel, W. N. Hindley. Iron & Steel Inst.—Advance Paper, no. 8, for meeting May 1924, 12 pp., 12 figs. It is shown that arsenic combines with iron forming compound Fe_2As at temperatures of 700 deg. and over, and this compound diffuses into iron or steel forming solid solutions; presence of arsenic in solid solution, although not preventing corrosion in moist air, retards this action to some extent.

Automobile. Automobile Sheet Steel Specifications, H. M. Williams. Am. Soc. Steel Treating —Trans., vol. 5, no. 1, Jan. 1924, pp. 82-88. Salient factors in connection with chemical and physical specifications and inspection of sheet steel for automotive and other similar industrial purposes; tentative specifications of Gen. Motors Co. on cold-rolled strip steel and sheet steel, including physical and chemical tests applied to these materials.

Stainless Steel for Automobiles. Automobile Engr., vol. 14, no. 191, July 1924, pp. 201-202, 1 fig. Discusses properties, heat treatment, advantages, and disadvantages of stainless steel.

Basic and Acid, Comparison. Comparative Investigation of Basic and Acid Steels. Foundry Trade Jl., vol. 29, no. 394, Mar. 6, 1924, pp. 200-201. Also Iron & Coal Trades Rev., vol. 108, no. 2922, Feb. 29, 1924, p. 352. Abstract of paper by F. Schmitz published in recent issue of Stahl u. Eisen, giving details of tests made by author, using new method of comparing basic and acid steels.

Blowholes. An Hypothesis on the Origin of Blowholes in Steel Ingots (Une hypothèse relative à l'origine des ruchages de soufflures dans les lingots d'acier), K.-G. Troubine. Revue de Métallurgie, vol. 21, no. 5, May 1924, pp. 288-294, 6 figs. Author propounds theory on origin of blowholes. Translated from Russian.

Brittleness. See Fractures.

Bronze, Penetration by. Penetration of Steel by Bronze at High Temperature (La pénétration dans l'acier du bronze à haute température), R. Perrin. Revue de Métallurgie, vol. 29, no. 9, Sept. 1924, pp. 531-538, 18 figs. Discusses lining of steel by means of bronze in which mutual penetration takes place as in cementation and gives experiments with carbon, nickel, chrome-nickel and other steels.

Calorizing. Making Edge Layers on Iron Heat Resistant by Diffusion (Hitzebeständige Randschichten auf Eisen durch Alitierung), A. Fry. Werkstattstechnik, vol. 18, no. 21, Nov. 1, 1924, pp. 614-616, 7 figs. Describes process of making surfaces of iron and steel heat resistant by diffusion with aluminum, patented by Krupp A. G.

Carbon. Iron-Carbon Diagram and Most Important Structural Elements of Carbon Steels (Das Eisen-Kohlenstoff-Diagramm und die wichtigsten Gefügebestandteile der Kohlenstoffstähle), K. Daeves. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Werkstoffausschuss), no. 42, Apr. 4, 1924, 10 pp., 20 figs. Critical points, significance of lines and points in diagram, changes in very rapid cooling and hardening, structural elements, etc.

The Structure of Troostite and Sorbite, O. V. Greene. Iron Age, vol. 114, no. 11, Sept. 11, 1924, pp. 615-617 and 670, 10 figs. Results of investigation whose purpose was development of actual structures of complex constituents of carbon steels; steels used were quenched and drawn at various temperatures that had been arranged with a view of producing troostite and sorbite in them; physical tests were used to correlate microstructure with physical properties.

See also Composition.

Carbon-Content Determination. Rapid Determination of Carbon Content in Steel by Measuring Electric Resistance According to Enlund (Ueber die Kohlenstoffschnellbestimmung im Stahl durch Elektrische Widerstandsmessung nach Enlund). G. Linke. Zeit. für Elektrochemie, vol. 30, no. 7, July 1924, pp. 319-322, 2 figs. Based on fact that equivalent quantities of substances dissolved in iron increase its resistance to conductivity by same amount.

The Carbometer, A Direct-Reading Apparatus for the Rapid and Accurate Determination of the Carbon Content of Steels in Open Hearth Steel Works, R. J. Eddy. Testing, vol. 1, nos. 1 and 2, Jan. and Feb., pp. 49-57 and 160-163, 9 figs. Apparatus by means of which percentage of carbon in steel bath may be rapidly and accurately determined through magnetic analysis.

The Determination of Carbon in Pig Iron, Steel and Ferroalloys by Means of Burning in Oxygen Current (Die Bestimmung des Kohlenstoffs in Roheisen, Stahl und Ferrolegierungen durch Verbrennen im Sauerstoffstrom), H. J. van Royen. Stahl u. Eisen, vol. 44, no. 15, Apr. 10, 1924, pp. 393-397, 1 fig. Investigations of weight-

analytical carbon determination; completeness of combustion; combustion products; influence of size of cuttings; behavior of sulphur and phosphorus; determination of minimum working temperature; velocity of oxygen current; experimental equipment.

Carbon, Magnetism of Annealed. The Magnetism of Annealed Carbon Steels, S. W. J. Smith and W. V. Mayneord. Physical Soc. Lond.—Proc., vol. 37, no. 206, Dec. 15, 1924, pp. 1-14, 5 figs. Details of experiments regarding constitution of annealed carbon steels, residual magnetism of annealed steel rods, cause of change in sign of residual moment; experimental proof that reversal does not occur when laminations are absent, and practical applications; dependence of reversed moment upon percentage of carbon present, and upon dimension-ratio of rod; and dependence of reversed moment in a laminated rod upon magnetizing field.

Castings. See STEEL CASTINGS.

Cementation. Influence of Nitrogenated Cements on the Cementation of Steel (L'influence des céments azotés dans la cémentation des aciers), J. Musatti and M. Croce. Chimie & Industrie, special no., May 1924, pp. 319-337, 14 figs. Rôle of solid cementation powders in process of steel cementation; results of tests.

Cementite. Free and Pearlitic Cementite (Ueber freien und perlitischen Zementit), E. Maurer and F. Stäblein. Zeit. für anorganische u. allgemeine Chemie, vol. 137, no. 1-2, July 7, 1924, pp. 115-124, 5 figs. Specific electrical resistance of steel with variation in carbon content between 0 and 1.6 per cent is determined, and results after correction for effects of other alloying elements shown graphically and in tabular form; specific resistance of iron carbide was found to be between 0.8 and 0.9; using this value it is shown that curve of resistance of steel is approximately that of mechanical mixture of two constituents.

Influence of Different Constituents of Alloys on Caking of Cementite (Der Einfluss verschiedener Legierungselemente auf das Zusammenballen des Zementits), E. Piwowarsky. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, no. 33, 1924, 4 pp., 12 figs. Discusses effect of foreign bodies on caking of carbide in hyper-pearlitic steels, peculiar carbide formation in hypo-pearlitic steels and their relation to annealing and hardening.

Chrome. See CHROME STEEL.

Chrome-Nickel. See CHROME-NICKEL STEEL.

Chromium and Vanadium Determination in. Determination of Chromium and Vanadium in Steel, L. Lindemann. Indus. & Eng. Chem., vol. 16, no. 12, Dec. 1924, pp. 1271-1272. Method is based upon oxidation of chromium from trivalent to hexavalent condition in dilute sulphuric-acid solution by means of persulphate and permanganic acid, reduction of chromic acid and vanadic acid by means of ferrous sulphate, estimation of slight excess of ferrous sulphate by means of standard chromic-acid solution, followed by titration of vanadyl to vanadic acid by means of standard potassium permanganate solution.

Chromium Plating. See ELECTROPLATING, Chromium Plating of Steel.

Cobalt. See COBALT STEEL.

Cold-Rolled Strip. Cold Rolled Strip Steel, M. Farmer. Am. Soc. for Steel Treating—Trans., vol. 5, no. 6, June 1924, pp. 590-598. See also Forging—Stamping—Heat Treating, vol. 10, no. 8, Aug. 1924, pp. 295-297. Deals with production of cold-rolled strip steel, discussing the numerous factors which enter into manufacture of this product. Discusses casting temperatures, segregation of elements within ingots, rolling of ingots into billets and slabs and high-speed rolling of billets, pickling, and subsequent cold rolling operations. Review of the various grades of cold tempered strip steel. Discusses strips for special types of work.

Cold-Worked, Crystal Deformation in. Crystal Deformation in Cold-Worked Steel, H. H. Lester. Army Ordnance, vol. 5, no. 25, July-Aug. 1924, pp. 455-458, 44 figs. Preliminary study of behavior of atoms within iron crystal as it occurs in steel when metal is stressed up to and beyond elastic limit and up to and beyond yield point.

Cold Working. Cold-Working Steel Bars and Strips, S. Ashton Hand. Am. Mach., vol. 61, no. 17, Oct. 23, 1924, pp. 637-639, 6 figs. Annealing methods and temperatures at plant of Lancaster Steel Products Corpn., Lancaster, Pa.; pickling, and neutralizing effect of acid; machines for drawing, straightening, and cutting round stock; slitting and rolling strip steel.

Combined Iron and. Notes on Combined Iron and Steel, H. H. Shepherd. Metal Industry (Lond.), vol. 24, no. 24, June 13, 1924, pp. 577-578 and 588, 3 figs. Uses; composition; testing. Author's experience with "combined iron and steel" and "composite steel" is that failures of these materials are due chiefly to faults in manufacture of ingots or billets.

Composition. Common Elements in Plain Carbon Steel, V. E. Hillman and F. L. Coonan. Forging—Stamping—Heat Treating, vol. 10, no. 2, Feb. 1924, pp. 66-68. A non-technical discussion of properties imparted to steel by common elements entering into its composition; carbon plays most important rôle.

Copper. See ALLOY STEELS, Copper Steel.

Corrosion. Effect of Alkaline Solutions on the Corrosion of Steel Immersed in Water, F. N. Speller and C. R. Texter. Indus. & Eng. Chem., vol. 16, no. 4, Apr. 1924, pp. 393-397, 10 figs. It is shown that rate of corrosion in steel pipe is decreased in closed system by increasing concentrations of alkali; system of testing used measures average rate of corrosion at any time, but does not indicate pitting; initial rate of corrosion is shown to be nearly independent of alkalinity of water within limits of experiments.

How to Correct and Prevent Corrosion of Steel, T. A. Smith. Concrete, vol. 25, no. 3, Sept. 1924, pp. 79-81, 6 figs. Deals with weathering qualities of exterior face of reinforced concrete buildings. Discusses protection of steel reinforcement and of exposed steel work. From Turner Constructor.

The Natural Water Corrosion of Steel in Contact with Copper, W. G. Whitman and R. P. Russell. Indus. & Eng. Chem., vol. 16, no. 3, Mar. 1924, pp. 276-279, 1 fig. Experiments wherein natural-water corrosion of steel in contact with metal lower in electromotive series has been quantitatively determined; emphasizes importance of these quantitative data in deciding as to mechanism of corrosion of steel from both theoretical and practical viewpoints.

See also CORROSION, Iron and Steel.

Crystal Structure. Crystal Structure of Hard Steel, K. Heindlhofer. Physical Rev., vol. 24, no. 4, Oct. 1924, pp. 426-438, 5 figs. Theories of hardness of metals. Using an X-ray spectrometer with ionization chamber and reflecting Mo $K\alpha$ and $K\beta$ rays from small blocks of steel, spectra were determined for 0.80 and 1.31 per cent carbon steels both in coarse and in fine martensitic condition.

Crystal Structure, X-Ray Analysis of. X-Ray Investigations of the Crystal Structure of Steel

(Röntgenundersökningar över stålets kristallstruktur), A. Westgren and G. Phragmén. Jernkontorets Annaler, vol. 107, no. 12, 1923, pp. 449-466, 12 figs. Method of taking X-ray photograms of rotating iron crystals and analysis of same confirming known theories regarding cubical structure of such crystals.

X-Ray Studies on the Crystal Structure of Steel, A. Westgren and G. Prhagmén. Iron & Steel Inst.—Advance Paper no. 16, for meeting May 1924, 14 pp., 8 figs. Crystal structure of iron modifications; crystal shape of cementite; structure of austenite.

Damascene. Damascene Steel and Damascene Blades (Du damassé et des lames de Damas), B. Zschokke. Revue de Métallurgie, vol. 21, no. 11, Nov. 1924, pp. 639-669, 21 figs. Discusses ancient methods of production and gives micrographic details, composition, Brinell hardness, etc., of Damascene and Solingen blades.

Damascene Steels (Beitrag zur Frage des Damaszenerstahls), K. Harnecker. Stahl u. Eisen, vol. 44, no. 45, Nov. 6, 1924, pp. 1409-1411, 17 figs. on supp. plates. Discusses attempts to produce it from cementation steel and cast steel.

Dephosphorizing. Dephosphorizing in Open-Hearth and Electric Furnaces by Means of the Basic Process (Defosforazione al forno Martin ed al forno elettrico col processo basico), E. De-Luisi. Rassegna Mineraria Metallurgica e Chimica, vol. 61, no. 2, Aug. 15, 1924, pp. 29-34. Details of oxidizing agents and reactions, composition of slag, etc.

Die. See DIES, Blanking and Extruding, Steel for; Forging.

Drill, Defects in. See DRILLS, Steel for, Defects in.

Elastic Limit. Determination of the Elastic Limit of Steels (Détermination industrielle de la limite élastique des aciers), J. Durand. Génie Civil, vol. 84, no. 9, Mar. 1, 1924, pp. 205-208, 3 figs. Discusses three methods of determining elastic limit of steel for industrial uses; comparison of results.

High Elastic Limit of Mild Steel and Its General Applications, G. W. Barr, F. G. Martin and A. T. Wall. Engineering, vol. 117, no. 3042, Apr. 18, 1924, pp. 510-511, 4 figs. See also Engineer, vol. 137, no. 3565, Apr. 25, 1924, pp. 443-444, 4 figs. Describes new mild steel which possesses very high elastic limit, and discusses some of its possibilities.

Elastic State, Magnetic Determination of. Magnetic Determination of the Elastic State, A. V. de Forest. Am. Soc. Steel Treating—Trans., vol. 6, no. 6, Dec. 1924, pp. 653-668, 8 figs. Discusses relations between stress and certain magnetic properties; describes method of a.c. magnetic measurements which gives critical determination of elastic limit; relation between elastic and fatigue properties is illustrated by means of Jenkin model and magnetic results interpreted from that point of view.

Electric, Testing of. B. D. Enlund Process of Electric Testing of Steel (Elektrische Stahlprüfungs-Verfahren von B. D. Enlund), B. Jkerrman. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 24, June 14, 1924, pp. 629-631, 7 figs. Shows that by measuring resistance in test bars, carbon content and total of other ingredients can be determined during decarbonization in simplest way.

Fatigue. Recent English Endurance Tests of Steel and Other Metals. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 709-710. Comparison of endurance limit and static strength; effect of temperature and viscosity of material. Tests carried out at Nat. Physical Laboratory, London.

Strength at Fatigue in High-Frequency Loading (Ermüdungsfestigkeit bei hohen Beanspruchungsfrequenzen), W. Hort. Zeit. für technische Physik, vol. 5, no. 10, 1924, pp. 433-436, 6 figs. See also Maschinenbau, vol. 3, no. 27, Nov. 13, 1924, pp. 1038-1040, 6 figs. Describes new method of testing and gives numerical results of tests with turbine blades.

See also IRON AND STEEL, Fatigue.

Finishing Melting Temperatures. Finishing Melting Temperatures of Simple Ingot Steels, H. D. Hibbard. Am. Inst. Min. & Met. Engrs.—Trans., no. 1384-C, Dec. 1924, 13 pp. Information regarding temperatures of molten steels, covering all carbon contents up to 1.5 per cent.

Forging Temperature. On the Forging Temperature of Steels, Kôtarô Honda. Iron & Steel Inst.—Advance Paper no. 9, for meeting May 1924, 5 pp., 4 figs. See also Tôkohu Imperial Univ.—Sci. Repts., vol. 13, no. 1, Oct. 1924, pp. 21-25, 5 figs. Investigation shows that in case of carbon steels, elongation-temperature curve has generally maxima and minima, and hence in process of forging low-carbon steels it is better to take every precaution against fall of temperature to 900 deg., where elongation is at minimum; in case of carbon steels, as elongation at ordinary temperature is greater than that at 200 to 300 deg., process of slowly stretching or bending a sample at room temperature rather than at 200 to 300 deg. is safeguard against fracturing.

Foundries. See FOUNDRIES, Steel.

Fractures. Black Fracture (Ueber Schwarzbruch), F. Rapatz and H. Pollack. Stahl u. Eisen, vol. 44, no. 48, Nov. 27, 1924, pp. 1509-1514, 18 figs. General conditions for separation of graphite; origin of black fracture; explanation of different formations; removal of black fracture.

Intercrystalline Fracture in Steel, R. S. Williams and V. O. Homerberg. Am. Soc. Steel Treating—Trans., vol. 5, no. 4, Apr. 1924, pp. 399-412, 30 figs. Discusses abnormal type of failure in mild steel characterized by intercrystalline cracking and produced by action of cathodic hydrogen or caustic soda solutions; effect of hydrogen on steel under tension and action of alkaline solutions on inclusions of known chemical composition artificially introduced.

Temper Brittleness in Steel (Anlassprödigkeit in Stahl), Geo. Wazau. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 46, Nov. 15, 1924, pp. 1185-1190, 24 figs. Investigation of certain cases of extraordinary brittleness of steel products with aid of the Fry lines of force; causes of fracture are traced to superimposing of "cold working" and "tempering."

Gage. See GAGES, Steels for.

Grain Growth. An Occurrence of Grain Growth in Steel, A. A. Blue. Iron Age, vol. 113, nos. 10 and 18, Mar. 6 and May 1, 1924, pp. 716-718 and 1271-1273, 17 figs. Mar. 6: Carbonizing under certain conditions weakens steel; carbon shell causes internal pressure and weak ferrite bands. May 1: Further results of carbonizing, hardening and drawing back; comparison with double quenching and drawing; band formations.

Hardened, Fundamental Defects. Some Fundamental Defects of Hardened Steels, L. Aitchison. Am. Soc. Steel Treating—Trans., vol. 5, no. 5, May 1924, pp. 491-503, 3 figs. Deals with certain properties of fully hardened steels that can only be regarded as being of nature of defects; discusses two such defects, namely, abnormally low value of limit of proportionality (elastic limit), and instability of volume which characterizes hardened steels; gives values of limit of proportionality in different hardened steels, and shows that there is very large difference between actual stress which produces some permanent deforma-

tion in steel, and stress which is generally called yield point.

Heat Treatment of. See STEEL, HEAT TREATMENT OF.

High Pressures and Temperatures. Steel for Higher Pressures and Elevated Temperatures, V. T. Malcolm. Power, vol. 59, no. 26, June 24, 1924, pp. 1020-1021, 3 figs. Physical properties resulting from fine, dense structure.

High-Speed. See STEEL, HIGH-SPEED.

High-Sulphur. Effect of Zirconium on Hot Rolling Properties of High-sulphur Steels and the Occurrence of Zirconium Sulfide, A. L. Field. Am. Inst. Min. & Met. Engrs.—Trans., no. 1306-S, Feb. 1924, 17 pp., 10 figs. Describes hot-rolling properties of series of high-sulphur steels; shows how zirconium reacts with sulphur content of molten steel.

High Temperature, Effect on Stresses. The Effect of High Temperature on the Range of Repetition Stresses on Steel, F. C. Lea and H. P. Budgen. Engineering, vol. 118, nos. 3066 and 3067, Oct. 3 and 10, 1924, pp. 500 and 532-534, 8 figs. Describes experiments carried out to determine ranges of stress for various mean stresses that certain steels would withstand when tested under 2000 cycles per min. and at temperatures varying from 15 deg. to 800 deg. cent.

Hot Pressing of. Hot-pressing Steel Parts, E. W. Zeh. Machy. (N. Y.), vol. 30, no. 6, Feb. 1924, pp. 434-435, 3 figs. Machy. (Lond.), vol. 24, no. 622, Aug. 28, 1924, pp. 681-682, 4 figs. New application of a process heretofore employed only in manufacturing parts from softer metals. Now possible to hot-press steel parts in an almost endless variety of shapes. Briefly, process consists of heating slugs of steel to about 1800 deg. fahr. and then pressing them to desired shape in tungsten-steel dies having cavities corresponding to outside of desired part.

Hot Rolling, Effect of. Rolling Refines Grain Structure, W. J. Crook. Iron Trade Rev., vol. 75, no. 21, Nov. 20, 1924, pp. 1365-1369, 12 figs. Hot rolling reduces grain size of low-carbon steel; further refinement is afforded by annealing; experiments contradict theory that no change in size occurs below transformation point.

Identification by Emery-Wheel Sparks. Differentiation of Steels by Examination of Emery-Wheel Sparks in Air and in Oxygen (Différenciation des aciers par l'examen des étincelles de meulage dans l'air et dans l'oxygène), E. Pitois. Académie des Sciences—Comptes Rendus, vol. 178, no. 11, Mar. 10, 1924, pp. 942-944. By placing sheet of glass in path of sparks and examining incrustations so obtained, it is found that, in air, most of particles obtained by grinding from ordinary steels undergo fusion; these incrustations are not wholly pearlitic, but exhibit wide regions of ferrite resulting from decarburization, latter becoming complete in atmosphere of oxygen; photographic representations of sparks were obtained; this method of examination is of special value for valve steels.

Impact Resistance. Effect of Temperature on the Impact Resistance of Low-Carbon Steel Deformed at Different Temperatures, N. Richardson and E. K. MacNutt. Am. Soc. Steel Treating—Trans., vol. 5, no. 4, Apr. 1924, pp. 348-360, 10 figs. Results of tests show that material of described type deformed at temperature from — 58 to 700 deg. fahr., when tested at normal atmospheric temperatures, has about 7 to 14 per cent of impact resistance shown by annealed non-deformed material; material deformed at 570 deg. fahr. "blue-brittle" temperature has lower impact value when tested at temperatures between — 58 to 700 deg., than non-deformed material; etc.

Iron Alloys. See IRON ALLOYS.

Iron and. See IRON AND STEEL.

Macroscopic Examination. The Macroscopic Examination of Steel, V. O. Homerberg. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 295-314, 30 figs. Explains manner in which segregation takes place in steel; method of preparing specimens; formulas of etching reagents, together with directions for their use and necessary precautions to be taken; macrographs are included to illustrate results obtained from use of these different reagents.

Magnet. A Study of the Old and the New Magnet Steels, E. Gumlich. Testing, vol. 1, no. 3, Mar. 1924, pp. 194-222, 10 figs. Deductions, based mostly on investigations undertaken in Magnetic Laboratory of Physico-Technical Govt. Inst. (Phys. Techn. Reichsanstalt) at Charlottenburg, reviewing what a permanent magnet is able and is required to accomplish, and which of the older and newer kinds of steel are meeting the respective requirements.

Magnet Steel, with Special Consideration of the Relations Between Carbon and the Magnetic Properties (Ueber Magnetstahl unter besonderer Berücksichtigung der Beziehungen zwischen Kohlenstoff und den magnetischen Eigenschaften), Geo. Hannack. Stahl u. Eisen, vol. 44, no. 41, Oct. 9, 1924, pp. 1237-1243, 4 figs. Historical review of tungsten and chrome steel; influence of treatment; treatment and hardening temperature; carbon content; cobalt magnet steel.

See also COBALT STEEL.

Magnetic Analysis. Exploring Within the Steel, A. G. Ingalls. Sci. Am., vol. 130, no. 5, May 1924, pp. 316-317 and 366-367, 6 figs. How magnetic analysis indicates presence of flaws in rails and beams and hoisting cables.

See also MAGNETIC ANALYSIS.

Magnetic Properties. The Dependence of Coercive Force and the Remanence on the Magnetizing Field Strength (Die Abhängigkeit der Koerzitivkraft und der Remanenz von der Magnetisierungsfeldstärke), J. Würschmidt. Kruppsche Monatshefte, vol. 5, Jan. 1924, pp. 10-11, 2 figs. Results of measurements carried out on a cobalt-manganese-chrome and a tungsten steel.

The Effect of Changes in Total Carbon and in the Condition of Carbides on the Magnetic Properties of Steel, A. W. Smith, E. D. Campbell and Wm. L. Fink. Physical Rev., vol. 23, no. 3, Mar. 1924, pp. 377-385, 7 figs. Variation of magnetic properties of carbon steel and chrome steel with per cent carbon, for annealed and quenched samples; magnetic potentiometer method of determining normal magnetization curves for short bars.

Magnetic Testing of. Field of Magnetic Testing Broad. Iron Trade Rev., vol. 75, no. 11, Sept. 11, 1924, pp. 663-665, 4 figs. Developments in magnetic method of examining steel open way to many new applications, particularly in case of irregular shapes; employment of method on regular shapes commercialized.

The Magnetic Testing of Small Specimens, T. F. Wall. Engineering, vol. 117, no. 3036, Mar. 7, 1924, pp. 293-295, 7 figs. Method for testing magnetic qualities of specimen up to 2000 gausses, leading advantage of which is that closed magnetic circuit is used.

Magnetization Produced by Stress. Magnetization of Steel Under Tensile Stress (Aimantation de l'acier à la traction), L. Fraichet. Technique Moderne, vol. 16, no. 16, Aug. 15, 1924, pp. 541-547, 14 figs., and Génie Civil, vol. 8, no. 21, May 24, 1924, pp. 495-498, 8 figs. Discusses apparatus for recording variation of magnetization of bar when under tensile stress, and results

of tests carried out with it, showing that magnetization curves give more accurate indication as to nature and treatment of metal.

Manganese. See MANGANESE STEEL.

Manufacture. See STEEL MANUFACTURE.

Martensitic Structure. Nature of Martensitic Structure of Steel (Ueber die Natur des martensitischen Gefügebildes), F. Sauerwald and G. Jackwirth. Zeit. für anorganische u. allgemeine Chemie, vol. 140, no. 4, Nov. 17, 1924, pp. 391-398, 7 figs. on supp. plate. It appears that appearance of martensite in connection with etching of steel is caused by slip phenomena induced by stresses set up during quenching and that characteristic lines of structure are edges of slip planes; that structure is in no way dependent on carbon content of steel is shown by fact that it is present in pure nickel-iron alloys both on quenching and after slow cooling.

Mechanical Properties. The Dependence of the Mechanical Properties of Sub-Pearlitic Carbon Steels on Their Carbon Content, Forging Temperature and Heat Treatment (Die Abhängigkeit der mechanischen Eigenschaften unterperlitischer Kohlenstoffstähle von ihrem Kohlenstoffgehalte, der Schmiedetemperatur und der Wärmebehandlung), F. Schmitz. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Werkstoffausschuss, report no. 29, 1924, 8 pp., 7 figs. Recrystallization phenomena of austenite, ferrite and pearlite and their influence on notch action; practical application of results obtained.

Melting in Cupola. Melting Steel in a Cupola, J. Grennan. Am. Foundrymen's Assn.—Preprint no. 411, for meeting Oct. 11-16, 1924, 17 pp., 11 figs. Data of experiments conducted with a view to observing what actually happens to steel when it is melted in a cupola and to compare melting of steel with that of pig iron and scrap cast iron.

Metallurgical Defects, Detection of. Detecting Metallurgical Defects in Steel, F. C. Thompson. Metal Industry (Lond.), vol. 24, nos. 10 and 11, Mar. 7 and 14, 1924, pp. 229-230 and 261-262, 4 figs. Methods of examination, and causes of troubles occurring.

Micrographic Study. Micrographic Study of Plain Carbon Steel, R. Rimbach. Forging—Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 46-50, 33 figs. Presents very complete set of microphotographs showing effect of various heat treatments on 1.12 carbon steel.

Molybdenum. See MOLYBDENUM STEEL.

Nickel. See NICKEL STEEL.

Nickel-Copper. The Properties of Nickel-Copper Steel, J. A. Jones. Can. Chem. & Metallurgy, vol. 8, no. 11, Nov. 1924, pp. 264-265. Results of tests show that addition of copper up to 0.6 per cent, while not detrimental, does not produce marked beneficial effects.

Nitrogen in. Nitrogen in Steel—Prevention or Cure?, J. Kent Smith. Iron Age, vol. 114, no. 19, Nov. 6, 1924, pp. 1209-1210. Its removal facilitated by various additions; low-temperature production of iron in blast furnace advocated as preventive.

Osmondite. Osmondite (Ueber den Osmondit), E. Maurer. Stahl u. Eisen, vol. 44, no. 22, May 29, 1924, pp. 622-624, 6 figs. Osmondite is name given by Heyn and Bauer to troostite which is formed by tempering of steel with 0.95 up to 400 deg. cent.; characteristics of metal.

Oxy-Acetylene Flame Applied to. Steel under the Oxy-Acetylene Flame, A. S. Kinsey. Am. Soc. Steel Treating—Trans., vol. 6, no. 4, Oct. 1924, pp. 515-524, 2 figs. Points out that in burning of oxy-acetylene flame, which produces temperature of about 6300 deg. fahr., border combustion occurs which makes it possible to melt steel without oxidizing it; odd shapes and sizes of steel to be hardened, tempered or annealed, may easily be heated with oxy-acetylene torch, which has additional advantage of being adaptable to confined areas; economy and efficiency of oxy-acetylene flame is largely attributable to remarkable purity of 99.5-per cent oxygen, now commercially available.

Oxygen and Red Shortness. Oxygen and the Red Shortness of Steel, H. Monden. Iron Age, vol. 114, no. 21, Nov. 20, 1924, pp. 1338-1340, 3 figs. German investigation of effect of gases on rolling qualities; low-carbon basic open-hearth practice in Germany. Translated from Stahl u. Eisen, 1923, June 7 and 14. See reference to original article in Eng. Index 1923, p. 486, under heading OPEN-HEARTH FURNACES, Basic.

Partly-Killed. Partly Killed Simple Steels, H. D. Hibbard. Iron Age, vol. 114, nos. 10 and 11, Sept. 4 and 11, 1924, pp. 565 and 599-600, and 631-633. Comparison with killed and effervescing steels; gas holes and their effects; advantages of two heatings and rollings; settling and rising low-carbon and medium steels; steel for structural uses and for rails.

Pearlite. Pearlite, Troostite and Sorbite (Ueber den Perlit, Troostit und Sorbit), A. Schrader. Stahl u. Eisen, vol. 44, no. 12, Mar. 20, 1924, pp. 309-311, 5 figs. Results of microscopic investigations.

Perforation, Effect of. Influence of the Method of Punching Holes in Steel Bars (Note sur l'influence du mode de perçage des trous dans les barres en acier), A. de Marneffe. Revue Universelle des Mines, vol. 67, no. 1, Apr. 1, 1924, pp. 42-48, 7 figs. Results of tests carried out by author on samples with holes punched according to different methods, to determine effect of perforation on resistance of metal.

Phosphorus Segregations. "Phosphor Prints," Rob. H. Canfield. Chem. & Met. Eng., vol. 30, no. 12, Mar. 24, 1924, p. 470. New method of detecting phosphorus segregations in steel.

Pickling. Pickling; Or, the Action of Acid Solutions on Mild Steel on the Diffusion of Hydrogen Through the Metal, C. A. Edwards. Iron & Steel Inst.—Advance Paper no. 4, for meeting Sept. 1924, 36 pp., 15 figs. partly on supp. plates. Describes experiments.

Plates, Corrosion-Resistance Tests. Tests Steel Plates of Leviathan, G. B. Waterhouse. Iron Trade Rev., vol. 75, no. 4, July 24, 1924, pp. 229-230, 8 figs. Chemical and physical tests made by author on samples of original German plates and English plates which had been installed in 1919 fail to show clearly why German steel resisted corrosion more successfully during 10 years of service than other steel in 5 years. Copper present and banded structure may explain resistance.

Pressed. Redevelopment in Pressed Steel Practice, M. R. Innes. Forging—Stamping—Heat Treating, vol. 10, no. 7, July 1924, pp. 262-264, 6 figs. Pressed metal has many advantages over other methods of production, but common sense must prevent detrimental effect caused by making wild claims.

See also PRESSWORK, Pressed Steel, Application of.

Properties at Highest Temperatures. Steel at Highest Working Temperatures, P. Eyermann. Iron Age, vol. 114, no. 20, Nov. 13, 1924, pp. 1270-1273, 8 figs. Changes in strength and other properties of carbon and alloy steels at 500 to 1200 deg.; range of "reduced malleability" in hot working: results of tensile tests on eight steels.

Rerolled Bars. Rerolled Reinforcement Strong But Not Ductile, J. B. Kommers. Eng. News-Rec., vol. 93, no. 4, July 24, 1924, pp. 146-147. Results of tests comparing strength and ductility of new billet steel and rerolled steel reinforcing bars, made at Eng. Experiment Station, Univ. of Wis. Suggested improvements in rerolled material.

Rivet. Effect of Sulfur on Endurance Properties of Rivet Steel. Am. Soc. for Testing Matls.—Preprint no. 4a, for meeting June 24-27, 1924, 15 pp., 9 figs. Third preliminary report of Joint Committee on Investigation of Phosphorus and Sulphur in Steel. Describes endurance tests made at U. S. Naval Eng. Experiment Station, and results obtained.

Metallographic Investigation of Effect of Sulfur on Rivet Steel. Am. Soc. for Testing Matls.—Preprint no. 4b, for meeting June 24-27, 1924, 75 pp., 85 figs. partly on supp. plates. Fourth preliminary report of Joint Committee on Investigation of Phosphorus and Sulphur in Steel. Results of macroscopic investigation, investigation of non-metallic inclusions, and investigation of microstructure.

Rock-Drill. Rock-Drill Steel Problem in Australia, With Some Suggested Steps to Its Solution, G. L. Thirkell. Australasian Inst. Min. & Met.—Proc., no. 52, Dec. 31, 1923, pp. 79-128, 19 figs. Discusses properties of steel and their modifications, stresses to withstand, heat treatment, troubles with drill steels and their remedies, etc.

Rolling, Power Required for. See ROLLING MILLS, Power Consumption.

Sheet, Electric. Effect of Punching Strains on the Magnetic Properties of Electrical Sheet Steel, G. H. Cole. Elec. Jl., vol. 21, no. 2, Feb. 1924, pp. 55-61, 16 figs. Quantitative information concerning increase in hysteresis loss, decrease in permeability, and change in microstructure caused by punching operation, such as that used in production of armature stampings and certain transformer laminae. Studies included three classes of electrical sheet steel of eight different gages and efficacy of annealing in removing effects of punching stresses.

On the Influences of the Cold Rolling on the Properties of Electrical Sheet Steel and the Effects of Annealing, Y. Niwa and J. Minamizawa. Denki Gakkwai Zasshi (Inst. Elec. Engrs. of Japan—Jl.), no. 428, Mar. 1924, pp. 236-249, 15 figs. Silicon steel of 0.46 mm. and ordinary steel of 0.39 mm. are subjected to cold rolling down to 0.08 mm. and electric, magnetic, mechanic, and microscopic properties are tested at each step. Similarly, with annealed specimens shows steel increase in hysteresis loss is nearly proportional to reduction of thickness, etc. (In Japanese.)

The Influence of Grain Size on Losses from Generator and Transformer Plates (Der Einfluss der Korngrösse auf die Verlustziffern von Dynamo- und Transformatorenblechen), K. Daeves. Stahl u. Eisen, vol. 44, no. 42, Oct. 16, 1924, pp. 1283-1286. Shows influence of grain size on watt-loss coefficients; influence of C, P, Mn and Si on losses within certain boundaries; shows also that rolling pressures and heatings occurring in process of rolling from ingot to finished plate have great bearing on loss coefficients of finished plate.

Sheet, Lithographing. See LITHOGRAPHING, Steel Sheets and Tin Plate.

Sheet, Season Cracking of. The Embrittling Action of Some Salt Solutions on Mild Steel, T. Swinden. Birmingham Met. Soc.—Jl., vol. 8, no. 10, pp. 469-477. Discusses "season cracking," in particular relation to mild steel, under certain conditions. Effect of certain nitrate solutions on mild steel; examples of season cracking; theoretical considerations; suggestions for minimizing effect of nitrates on steel plates for concentrating pans.

Sheet, Standardization of. Why Not Simplification in Steel Sheets? Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 874-876. Economies that would accrue to manufacturers and consumers of sheets by eliminating some of the grades, finishes, and sizes in which sheets are made.

Silico-Manganese. See MANGANESE STEEL, Silico.

Silicon. See SILICON STEEL.

Sorbite. See Carbon; Pearlite.

Special Metallurgy of. Modern Developments in the Metallurgy of Special Steels, W. H. Hatfield. Iron & Coal Trades Rev., vol. 108, no. 2938, June 20, 1924, pp. 1055-1057. Discusses improvement in process of manufacture and manipulation resulting in increased reliability, modified and new compositions resulting in improved or new properties, and more intimate knowledge of properties of steel from designer's viewpoint. From paper read before Iron & Steel Sec., Empire Min. & Met. Congress.

Specific Resistance and Magnetic Properties. The Effect of Changes in Total Carbon and in the Condition of Carbides on the Specific Resistance and on Some Magnetic Properties of Steel, E. D. Campbell and G. W. Whitney. Iron & Steel Inst.—Advance Paper no. 3, for meeting Sept. 1924, 21 pp., 2 figs. Outlines method for preparing, on a laboratory scale, small steel bars differing only in carbon content and, to a negligible extent, in sulphur, and gives results of measurements of specific resistance and some magnetic measurements on annealed and oil-hardened bars.

Specifications. Requirements and Properties of Steels (Konstruktionsforderungen und Eigenschaften des Stahles), K. Wendt. Praktische Maschinen-Konstrukteur, vol. 57, nos. 28, 29, 30, 32, 33, 34, 37, 41, and 42, July 29, Aug. 5, 12, 26, Sept. 2, 9, 30, Oct. 28 and Nov. 4, 1924, pp. 393-397, 410, 417-420, 444-446, 458-460, 471-472, 505-508, 551-554, and 563-566, 94 figs. Development of high-grade steels; mechanical, physical, chemical and complex loading; behavior at high and low temperatures; different states of steels and their properties; heat treatment and alloying; formation of crystals; pipes, bubbles, stresses; forged and rolled steels; acceptance tests; standards; coöperation between contractors and metallurgists.

Spheroidized Cementite in Hypoeutectoid. Spheroidized Cementite in Hypoeutectoid Steel, R. S. MacPherran and J. F. Harper. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 341-374, 20 figs. Results of authors' experience in method of heat treating large forgings; results obtained by spheroidization of cementite of pearlitic constituent seem to warrant treatment given; treatment applied to cast steel results in corresponding improvement of physical properties. Photomicrographs.

Stainless. Metallurgical Data on Stainless Steels, H. H. Abram. Chem. & Met. Eng., vol. 30, no. 11, Mar. 17, 1924, pp. 430-431. Results of careful investigation of properties; tells how properties most desired in any particular case may be obtained by means of heat treatment.

Stainless Steel and Stainless Iron, O. K. Parmiter. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 315-340. Reviews history and development of stainless steel and stainless iron of 13 per cent chromium type; problems involved in manufacture of this material, its composition and effect of various elements upon it;

heat treatment, forging, normalizing, annealing, and hardening; physical properties; general properties of stainless steel; applications and possibilities of stainless iron.

Stainless Steels and their Practical Manipulation. Metal Industry (Lond.), vol. 25, no. 16, Oct. 17, 1924, pp. 379-381. Discusses many misconceptions that exist in regard to stainless steels, and advises correct method of working so as to obtain best results.

The "Stainless" Chromium Steels, W. H. Hatfield. Am. Electrochem. Soc.—Advance Paper no. 5, for meeting Oct. 2-4, 1924, pp. 63-73. Interesting aspects of influence of corroding media upon stainless chromium steels. Article confined to stainless steels in which 12 to 16 per cent of chromium is essential alloyed element.

See also Automobile; ALLOY STEELS, Corrosion-and-Heat-Resistant.

Standards for. Standards for Steel and Iron (Werkstoffnormen Stahl und Eisen). Stahl u. Eisen, vol. 44, no. 48, Nov. 27, 1924, pp. 1519-1522. List and discussion of standard sheets on steel and iron developed by German Industrial Standards Committee up to end of September 1924.

Strength at High Temperatures. See IRON AND STEEL, Strength at High Temperatures.

Strip. See Cold-Rolled Strip.

Strip, Cleaning. Continuous Cleaning of Strip Steel. Iron Age, vol. 113, no. 19, May 8, 1924, pp. 1358-1359, 2 figs. 16-block unit of Trumbull Steel Co., Warren, Ohio, has capacity of 50 tons per day.

Structural. See STRUCTURAL STEEL.

Submerged Corrosion. Effect of Hydrogen-Ion Concentration on the Submerged Corrosion of Steel, G. W. Whitman, R. P. Russell and V. J. Altieri. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 665-670, 6 figs. Main factors are protectiveness of films of corrosion products and rate of oxygen diffusion, film protectiveness being largely determined by pH of solution adjacent to corroding metal.

Sulphur and Carbon Determination. The Simultaneous Determination of Sulphur and Carbon in Steel, Pig Iron and Ferroalloys by Means of Burning in Oxygen Current (Die gleichzeitige Bestimmung des Schwefels und Kohlenstoffs in Stahl, Roheisen und Ferrolegierungen durch Verbrennung im Sauerstoffstrom), C. Holthaus. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, no. 41, Apr. 16, 1924, 5 pp., 2 figs. Stahl u. Eisen, vol. 44, no. 48, Nov. 27, 1924, pp. 1514-1519, 2 figs. Describes apparatus and method for rapid and accurate determination of sulphur and carbon through burning in oxygen current, followed by titration.

See also IRON, Sulphur Determination.

Temper Colors on. Note on "Temper" Colours, R. C. Gale. Chem. & Industry, vol. 43, no. 50, Dec. 12, 1924, pp. 349T-352T, 2 figs. Possible explanations of cause of color in films when piece of polished hardened steel is tempered by reheating; results of author's experiments to determine thicknesses of "temper" color films on steel.

Temperatures, Tapping and Pouring. Tapping and Pouring Temperatures of Open-Hearth Steel Melts (Abstich- und Vergiesstemperaturen von Martinstahlschmelzungen), C. Popp. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, no. 46, July 17, 1924, 5 pp., 8 figs. Results of measurements made at Thyssen works on a large number of melts by means of Holborn & Kurlbaum optical pyrometers.

Terminology. See IRON, Terminology.

Test Bars. Notes on Composition and Structure of A.S.T.M. Bar, J. W. Bolton. Am. Foundrymen's Assn.—Preprint no. 420, for meeting October 11-16, 1924, 27 pp., 32 figs. Effects of variation in composition and structure on properties of standard A.S.T.M. test bar. Extensive tests of bars from various mixtures studied, and results obtained compared from all angles. Concludes that until a very great deal more research data are available, it is best to stick to present standard bar. Effects of elements.

Testing. Dynamic Testing of Steels at the Higher Temperatures (Dynamische Prüfung des Stahles bei höheren Temperaturen), F. Körber and I. B. Simonsen. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 5, 1924, pp. 21-35, 9 figs. Results of dynamic hardness and fracture tests on carbon, tool, and high-speed steels, and their variation with temperature.

Inspects Stock by Brinell Test. Iron Trade Rev., vol. 75, no. 11, Sept. 11, 1924, pp. 666-667, 7 figs. Notes on special test developed in laboratories of Steel Products Co., Cleveland, Ohio, which is applied to inspection of material purchased for either hot or cold heading and subject to surface seams, pits, cracks, laps, improper anneal, etc.; developed as result of experiments to determine relative qualities of electric furnace and crucible steel for automotive poppet valves. Hardened cone used instead of ball.

Tests. What is Steel? A. Sauveur. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1338-S, May 1924, 22 pp., 15 figs. Results of experiments conducted in Metallurgical Laboratory of Harvard University, in which twisting and tensile stresses were applied to iron and steel bars heated at middle to predetermined temperatures, temperature falling gradually toward both ends of bars.

Thermal Expansion. Thermal Expansion of Soft and Hardened Steel (Thermische Ausdehnung von weichem und gehärtetem Stahl), A. Werner. Zeit. für Instrumentenkunde, vol. 44, no. 7, July 1924, pp. 315-320. Results of experiments with 34 samples of soft and hardened steels at temperatures from — 200 deg. to + 150 deg. cent., details of expansions, effect of chemical composition, etc.

Tool. See TOOL STEEL.

Troostite. See Carbon; Pearlite.

Welding. See ELECTRIC WELDING, ARC, Low-Carbon Steel; OXY-ACETYLENE WELDING, Medium High-Carbon Steel.

Welding Heat, Behavior at. The Behavior of Low-Carbon Sheet Iron at Welding Heat (Das Verhalten von Flusseisenblechen in der Schweisshitze), H. Schottky. Kruppsche Monatshefte, vol. 5, Jan. 1924, pp. 1-6, 11 figs. Through tests with series of silicon-free plates, it is shown that bending test at maximum temperatures—1350 to 1450 deg.—gives good idea of resistivity of low-carbon steel at welding heat.

Wire, Strength of. See WIRE, Steel.

Work-Hardening of. Influence of Temperature on the Work-Hardening of Metals, E. G. Herbert. Engineer, vol. 137, no. 3562, Apr. 4, 1924, pp. 356-357, 6 figs. Tests for measuring work-hardening properties of mild steel at succession of temperatures such as might be expected to be generated by action of cutting tool.

Works. See STEEL WORKS.

World Production. See IRON, PIG, World Production.

X-Ray Examination. Examination of Steel by X-Ray, L. C. Breed. Blast Furnace & Steel Plant, vol. 12, no. 11, Nov. 1924, pp. 517-518. Report

on spectrometer equipment at government arsenal, Watertown, Mass.

STEEL CASTINGS

Aluminum and Titanium as Deoxidizers. Aluminum and Titanium as Deoxidizers, Geo. F. Comstock. Iron Age, vol. 114, no. 23, Dec. 4, 1924, pp. 1477-1479, 10 figs. Comparative effect on acid electric steel castings; physical and photomicrographic results.

Annealing. Annealing Castings Electrically. Iron Trade Rev., vol. 75, no. 19, Nov. 6, 1924, pp. 1225-1227, 5 figs. Milwaukee manufacturer of steel castings adopts electric heat for annealing and heat treating product; variable-input arrangement conserves power; transfer table and storage track facilitate handling of cars.

Annealing Steel Castings and Its Importance to Consumers, H. A. Neel. Ry. & Locomotive Eng., vol. 37, no. 12, Dec. 1924, pp. 375-376. Benefits of steel castings from annealing are (1) increased physical properties; (2) relief of strains set up in cooling and in welding operation; and (3) increased machinability.

Carbon-Vanadium. Carbon and Carbon-Vanadium Steel Castings—A Comparison, J. M. Lessells. Am. Soc. Steel Treating—Trans., vol. 5, no. 2, Feb. 1924, pp. 144-152 and (discussion) 152-157, 7 figs. Physical properties of carbon and carbon-vanadium steel castings as obtained from coupon test pieces in cast, annealed, and normalized conditions; evidence is given to show that addition of vanadium as alloying element greatly improves quality of material.

Cleaning. Cleaning Steel Castings Economically. Abrasive Industry, vol. 5, no. 8, Aug. 1924, pp. 198-200, 6 figs. See also Foundry, vol. 52, no. 17, Sept. 1, 1924, pp. 688-690, 6 figs. Describes cleaning-room operations, consisting of sandblasting, tumbling, removing gates and risers, grinding, chipping, polishing, and inspecting, of Ohio Steel Foundry Co., Springfield, Ohio.

Cleaning-Cost Records. Keeps Record of Cleaning Costs, B. K. Price. Iron Trade Rev., vol. 74, no. 18, May 1, 1924, pp. 1165-1166 and 1169, 4 figs. Steel foundry pays grinder hands according to amount of metal removed; castings weighed before being delivered to grinder and again after being ground; production and wages stimulated.

Defects. Some Steel Foundry Experiences, H. V. Fell. Foundry Trade Jl., vol. 30, no. 422, Sept. 18, 1924, pp. 239-240, 19 figs. Describes steel castings made by author and indicates their defects and means by which they were overcome.

Design. Designing Steel Castings, E. R. Young. Machy. (N. Y.), vol. 30, nos. 9 and 10, May and June 1924, pp. 701-703 and 790-792, 8 figs., and Machy. (Lond.), vol. 24, no. 616 and 617, July 17 and 24, 1924, pp. 501-503 and 538-540, 8 figs. Problems encountered in production. May: Pattern design; effect of dry sand and green sand molds on shrinkage; cores; rip design; size and shape of castings; chemical composition; finish allowances. June: Engineering or structural design; castings of intricate design; fatigue strength of castings.

Hawse Pipes, Leviathan. Cast Large Steel Hawse Pipe. Foundry, vol. 52, no. 10, May 15, 1924, pp. 381-384, 7 figs. To replace Leviathan's defective cast-iron hawse pipes; steel castings required to resist heavy stress.

Heat Treatment. Making Steel Castings as Tough as Forgings, L. R. Mann. Can. Foundryman, vol. 15, no. 1, Jan. 1924, pp. 16-17, 2 figs. Proper heat treatment insures properties being imparted to metal which are comparable to those found in best forged steel. Extracts from paper read before Wis. Foundrymen's Assn.

Italian Industry. See IRON AND STEEL, Italian Industry.

Manganese-Steel. See MANGANESE STEEL, Casting.

Manufacture. Cast Steel, Its Manufacture, Qualities and Defects (L'Acier Moulé, sa Fabrication—Ses Qualités—ses Défauts), A. Pertus. Fonderie Moderne, vol. 18, Feb., Mar., and Apr. 1924, pp. 33-39, 39-76, and 93-97, 5 figs. Manufacture of steel castings: composition of metal; molding and casting.

Liquid Steel for Castings, T. E. Hull. Foundry Trade Jl., vol. 29, no. 396, Mar. 20, 1924, pp. 238-240. Deals with subject of liquid steel as required for sand molds in production of steel castings. Control of slag; slag inclusions; influence of dissolved or occluded gases; shrinkage; liquidity and fluidity of steel; chemical composition.

Liquid Steel for Light Castings, J. A. Holden. Foundry Trade Jl., vol. 29, no. 402, May 1, 1924, pp. 367-368. Shows that "Stock" plant, in addition to turning out mild steel of good quality, can be adapted for making many types of special steels. Probable cause of porosity in electric process of manufacture.

Manufacture of Steel Castings, G. Varley. Mech. Wld., vol. 75, nos. 1947, 1949, 1951, and 1952, Apr. 25, May 9, 23 and 30, 1924, pp. 260-261, 290-291, 322-323, and 339-340, 12 figs. Discussion of the different processes; teeming; molding; annealing; failures in manufacture. Reprinted from Trans. Liverpool Eng. Soc.

Speeding Up the Production of Large and Superior Steel Castings, S. G. Roberts. Compressed Air Mag., vol. 29, no. 1, Jan. 1924, pp. 731-736, 16 figs. Use of compressed air and pneumatic tools in plant of Wheeling Mold & Foundry Co., Wheeling, W. Va.; time and money saved, and large castings of a complicated character can be turned out rapidly with assurance of success.

The Manufacture of American Steel Castings, W. H. Woodhall. Foundry Trade Jl., vol. 29, no. 404, pp. 399-401. Molding methods, acid or basic melting, physical properties and tests, dirty versus clean steel, sampling, cleaning and inspection, annealing furnaces, annealing period, etc.

The Production of a Large Steel Casting, H. V. Fell. Foundry Trade Jl., vol. 30, no. 416, Aug. 7, 1924, pp. 114-116, 18 figs. Describes an example of this class of work as carried out by a large British firm, especially molding operations.

Properties and Uses. Broadening the Field for Steel Castings Through the Use of Alloys and Heat Treatment, F. Grotts. Am. Foundrymen's Assn.—Preprint no. 416, for meeting Oct. 11-16, 1924, 15 pp., 10 figs. Points out some of the possibilities for broadening field of steel castings by use of different special alloys and by suitable heat treatments. States that proof of this lies in fact that greater strength, resistance to shock and wearing qualities can be obtained with small costs and practically no change in machinability. Low carbon, medium carbon, and high carbon steels are discussed in relation to their uses and physical proptrties.

Shells. Production of an Electric Shell at a Steel Foundry (Die Entstehung eines Polgehäuses in der Stahlgiesserei), K. Stoll. Giesserei-Zeitung, vol. 21, no. 13, July 1, 1924, pp. 273-276, 8 figs. Discusses team work of foundry and model makers; explains details of work of model makers, molders and cleaners, and follows production of cast-steel shell for an electric machine.

Sink Heads. Proportioning and Shaping of Sink Heads, J. H. Hall. Iron Age, vol. 114, no. 14, Oct. 2, 1924, pp. 822-823. How not only a saving of metal can be secured, but a lowering of cost of steel, if proportioning and shaping of risers is carefully studied. Advantages of use of a comparatively new kind of riser which is cone shaped.

Temperature, Influence of. Influence of Temperature on the Strength of Properties of Cast Steel (Einfluss der Temperatur auf die Festigkeitseigenschaften von Stahlguss), F. Körber. Stahl u. Eisen, vol. 44, no. 52, Dec. 25, 1924, pp. 1765-1771, 19 figs. partly on supp. plate. Importance of testing cast steel at high temperatures; notched-bar tests on cast and annealed Bessemer, open-hearth, and electric steel up to 500 deg. cent.; practical conclusions; relation of temperature to notched-bar toughness in low-carbon steel after different pre-treating methods.

Testing. See FORGINGS, Steel, Testing of.

Valves. Valve Castings Made in Steel, P. Dwyer. Foundry, vol. 52, no. 15, Aug. 1, 1924, pp. 579-583 and 605, 8 figs. Various component parts of valves for nearly every purpose beyond capacity of cast iron are poured from steel melted in electric furnace.

X-Ray Examination. Technic of X-Ray Is Improving. Iron Trade Rev., vol. 75, no. 11, Sept. 11, 1924, pp. 668-671, 7 figs. Experience at Watertown arsenal, Watertown, Mass., in application of X-ray process to steel castings, yields more accurate and definite results. Interpretation of radiographs are reduced to formulas.

Using X-Rays to Detect Hidden Dangers in Plant Equipmnet, H. H. Lester, E. C. Herthel, Wm. Mendius and Wm. V. Ischie. Chem. & Met. Eng., vol. 31, no. 16, Oct. 20, 1924, pp. 619-622, 13 figs. Points out that defects in castings used in high-pressure stills, overlooked in inspection by usual method, are easily seen in radiograph.

X-Ray Tests Applied to the Problems of the Steel Industry, H. H. Lester. Am. Soc. Steel Treating—Trans., vol. 6, no. 5, Nov. 1924, pp. 575-603 and (discussion) 603-605, 28 figs. X-ray tests with collateral analyses indicate that defects in steel castings fall into relatively few classes traceable to definite and simple causes most or all of which are removable; when defects are detected by X-ray examination and corrected by changing castings technique, they tend to stay corrected; it is possible by this method to eliminate from 70 to 90 per cent of major defects; metal sections up to 3 in. in thickness may be examined.

STEEL, HEAT TREATMENT OF

Alloy Steels. See STEEL MANUFACTURE, Alloy Steel.

Annealing. Annealing, Hardening and Reheating of Refined Steel (Ueber Glühen, Härten und Vergüten von Edelstählen), F. Rapatz. Werkstattstechnik, vol. 18, no. 21, Nov. 1, 1924, pp. 616-619, 7 figs. The iron-carbon diagram of state and its change due to alloying metals. Structural elements; volume change in hardening; etc.

Annealing Suitable for Steels Generally Used by the State Railways (La ricottura di qualità che più giova agli acciai usati comunemente dalle FF. SS.), P. Forcella. Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 6, June 15, 1924, pp. 204-207, 17 figs. Discusses variation of mechanic and dynamic properties of 5 per cent nickel steels at annealing temperatures of 750 deg. to 1100 deg., also microstructural characteristics.

Annealing, Sheet Metal. Annealing of Plates Used in Electrical Construction (Le recuit des tôles utilisées dans la construction électrique), R. Cazaud. Revue de Métallurgie, vol. 21, no. 8, Aug. 1924, pp. 473-483, 18 figs. Requirements of thin sheets used in electric machines; effect of mechanical treatment on magnetic qualities; effect of temperature, silicon content, atmosphere, etc.

Automobile Parts. The Heat Treatment of Automobile Parts, J. M. Watson. Am. Soc. Steel Treating—Trans., vol. 6, no. 6, Dec. 1924, pp. 716-723 and (discussion) 723-727, 6 figs. Methods and heating equipment used in modern automobile factory; furnaces of automatic type especially designed to meet requirements of materials being heat treated; they are of oil-fired conveyor type.

Ball Bearings. See BEARINGS, BALL, Heat Treatment.

Brazed and Welded Steel. Some Effects of Brazing and Welding, H. C. Knerr. Forging—Stamping—Heat Treating, vol. 10, no. 1, Jan. 1924, pp. 33-37, 20 figs. Application of heat as in brazing and welding removes strength produced by cold working; effect of heat treatment on brazed and welded steel.

Carbon and High Speed Tools. Effect of Heat Treatment on the Cutting Capacity of High-Speed Steels (Influence du traitement thermique sur la capacité de coupe des aciers rapides), H. Pommerenke and R. Dewert. Revue de Métallurgie, vol. 21, no. 7, July 1924, pp. 371-395, 134 figs. Gives results of tests to find simple, rapid, and inexpensive method of hardness testing, based on tests with Herbert machine, including micrographic examination of structure.

Heat Treatment of Carbon and High-Speed Steel Tools, Jos. K. Wood. Am. Mach., vol. 61, no. 21, Nov. 20, 1924, pp. 791-793. Determining factors in development of metal-cutting tools; heat treatment for carbon-steel tools; compositions and heat treatment for high-speed steel tools.

Carburizing. Heat-treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 23, no. 596, Feb. 28, 1924, pp. 707-711, 4 figs. Carbon concentration and core condition; deep penetration; wasteful carburization; distortion factor; heating for quenching.

Practical Views on Carburizing, J. Sorenson. Fuels & Furnaces, vol. 2, no. 6, June 1924, pp. 583-584 and 587-588, 2 figs. Outlines the various thermal treatments in carburizing and results to be secured with each.

Case-Carburizing. See CASE-HARDENING.

Cast Steel. Heat-Treatment of Steel with Special Reference to Production, J. W. Urguhart. Machy. (Lond.), vol. 24, no. 616, July 17, 1924, pp. 497-499. Discusses steel castings, their heat treatment, annealing and its effects, correct furnace design, cracked castings.

Defects Caused by Errors in. Observations on Some Causes and Remedies for Defects in Steel With Special Reference to Practical Application of Heat Treatment, R. H. Harriss. S. African Instn. Engrs., vol. 23, no. 4, Nov. 1924, pp. 288-320, 47 figs. Starts from ingot and traces origin and cause of defects in steel brought about by errors in heat treatment and cooling in ingot stage.

Definitions. Comparison of Heat-Treatment Definitions. Mech. Eng., vol. 46, no. 7, July 1924, p. 435. Varying views held by committees of Am. Soc. Steel Treating, Soc. Automotive Engrs., and Am. Soc. Testing Matls.

Dies. Heat Treating High Speed Steel Dies, G. C. Davis. Forging—Stamping—Heat Treating, vol. 10, no. 9, Sept. 1924, pp. 360-362, 3 figs. Description of heat-treating department at plant of Gray & Davis, Inc., Cambridge, Mass. Heat treatment of high-speed steel blanking dies that do not readily lend themselves to grinding after treatment offer many difficult problems.

Heat-treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 24, nos. 612, 621, and 623, June 19, Aug. 21 and Sept. 4, 1924, pp. 361-362, 649-652 and 709-712. June 19: Quarter-elliptical automobile spring. Aug. 21: Treatment of die blocks; carburizing; hardening of mild steel dies. Sept. 4: Composite steel dies; best hardening procedure; rehardening.

Electric Furnaces. See ELECTRIC FURNACES, Heat-Treating.

Fatigue Resistance, Effect on. Experiments on the Fatigue of Steel, A. Ono. Kyushu Imperial Univ., College of Eng—Memoirs, vol. 3, no. 2, 1924, pp. 51-85, 21 figs. Deals with effect of heat treatment on fatigue resistance of steel, especially nickel-chrome steel. Results of fatigue, statical, and impact tests.

Fundamental Principles. Heat Treatment and Metallography of Steel, H. C. Knerr. Forging—Stamping—Heat Treating, vol. 10, nos. 9, 10, 11, and 12, Sept., Oct., Nov., and Dec., 1924, pp. 319-321, 385-392, 419-430, and 459-460, 44 figs. A practical course in elements of physical metallurgy. Basis of a series of lectures given by author in connection with course in heat treatment and metallography of steel at Temple Univ., Phila., Pa., under auspices of Phila. Chapter, Am. Soc. for Steel Treating.

Furnaces. See FURNACES, HEAT-TREATING.

Gear Blanks. Heat Treating Gear Blanks, R. L. Manier. Fuels & Furnaces, vol. 2, no. 2, Feb. 1924, pp. 161-163, 2 figs. Automatic proportioning system used in firing normalizing and carburizing furnaces at New Process Gear Corpn.

Hardening. A Shop Talk on Selective Hardening Methods. Can. Machy., vol. 31, no. 9, Feb. 28, 1924, pp. 23 and 36, 2 figs. Discusses methods available, viz., selective quenching, selective heating, and selective surface exposure.

Development of a Novel Cyanide Hardening Process, C. Ringstrom. Gas Age-Rec., vol. 53, no. 25, June 21, 1924, pp. 871-873, 3 figs. Describes new and economical process where use of proper fuel has proved necessary for complete success.

The Hardening of Steel, W. Rosenhain. Iron & Steel Inst.—Advance Paper no. 8, for meeting Sept. 1924, 17 pp., 9 figs. partly on supp. plate. Describes some of the outstanding phenomena connected with hardening and tempering of certain non-ferrous alloys, in order to show analogy which exists between these phenomena and well-known behavior of iron-carbon alloys, and considers its applicability to particular case of steel.

See also Annealing.

High-Speed Steel. See STEEL, HIGH-SPEED, Forging and Tempering; Hardening; Properties and Treatment.

Liquid Heating. Advantages of Uniformity in Heat Treatment, A. E. Bellis. Can. Machy., vol. 31, no. 4, Jan. 24, 1924, pp. 17-18, 4 figs. Notes on method of heat treating using a liquid heating medium; its advantages; possibilities of overcoming temperature troubles by using this method becoming more widely recognized.

Mild Steel. The Heat Treatment of Mild Steel, R. T. Rolfe. Metal Industry (Lond.), vol. 24, nos. 1, 2, and 3, Jan. 4, 11, and 18, 1924, pp. 9-10, 33-34, and 57-59, 10 figs. Structure of mild steel; need for heat treatment of mild steel; heat treating castings; mechanism of heat treatment; burnt steel; typical range of properties obtainable; heat-treating forgings; work hardening; breaking-down of pearlite; etc.

Motor-Truck Parts. System as Applied to the Control of Furnace Temperatures and Heat Treatment of Automobile Truck Parts, J. Sorenson. Am. Soc. for Steel Treating—Trans., vol. 6, no. 1, July 1924, pp. 77-83, 1 fig. Discusses adequate control system in inspecting raw materials and subsequent heat treatment of parts; accurate heat treatment, laboratory control in receiving of material and inspection of final product.

Nickel-Steel Carburization. Heat-treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 23, no. 595, Feb. 21, 1924, pp. 681-684, 4 figs. Carburization of nickel steels.

Permanent Magnets. Investigation of the Treatment of Steel for Permanent Magnets. R. L. Dowdell. Am. Soc. Steel Treating—Trans., vol. 5, no. 1, Jan. 1924, pp. 27-65, 17 figs. Deals with various treatments of tungsten, chromium, cobalt-chrome and miscellaneous magnet steels in order to give them greatest permanence; explains simple but accurate testing apparatus for bar magnets; compares new type of coercive force called open-circuit with usual coercive force; gives magnetic saturation curves, and natural and artificial aging curves for different treatments.

Piston Pins and Shackle Bolts. Individual Heat Treatment Will Improve Quality of Product, C. N. Dawes. Automotive Industries, vol. 50, no. 4, Jan. 24, 1924, p. 177, 2 figs. Special furnaces developed for handling of piston pins and shackle bolts make it possible to treat each part separately; specific requirements should determine furnace type used.

Practice. Heat-treated Steel, J. W. Urquhart. Mech. Wld., vol. 74, no. 1925, vol. 75, nos. 1931, 1936, 1938, 1944, 1950, and 1955, and vol. 76, nos. 1960, 1963, 1972, and 1973, Nov. 23, 1923, Jan. 4, Feb. 8, 22, Apr. 4, May 16, June 20, July 25, Aug. 15, Oct. 17 and 24, 1924, pp. 321-323, 5-7, 81-82, 117-118, 212-214, 311-312, 385-386, 57-58, 105-106, 252, and 267-268, 10 figs. General outline of present-day practice followed in work of conditioning steel before it can be used in construction of various productions of mechanical engineer, efficiency of which depends upon maximum tensile strength allied with minimum weight and bulk. Diagrammatic representation of steel structure; pearlite; magnetic susceptibility; temperature testings; limitation of magnetic control; dynamic versus static qualities; heat-treating operations; toughening steel.

Principles and Applications. See HEAT TREATING, Principles and Applications.

Problems. Heat-treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 23, no. 600, Mar. 27, 1924, pp. 832-835, 6 figs., and vol. 24, no. 608, May 22, 1924, pp. 230-233. Mar. 27: Machining difficulties with mild steels; difficulties resulting from high and deep carbon casings; typical case in carburizing steels; when double quench is necessary; micrographs; French and American high-temperature initial quenching; distinction between second quenching and hardening; destructive effect of excessive temperature; structure of carbon steel gears. May 22: Locomotive and car-axle treatments; mild treatment; production of unequal stresses; importance of reduction forging and steel selection for this work; quenching media; dynamic endurance and tensile strength; quenching of coreless pieces.

Problems of the Heat Treater as Influenced by the Pre-Natal History of the Material, P. E. McKinney. Am. Soc. for Steel Treating—Trans., vol. 6, no. 1, July 1924, pp. 51-65, 14 figs. Discusses melting and refining processes and suggests (1) classification of material based on character of service for which intended, without regard to composition, (2) establishment of recommended practices for production of ingot material, similar to heat treatment, (3) develop-

ment of methods for testing which will detect inherent defects.

Quenching. Effect of Repeated Quenching on Hardness, A. Katto. Forging—Stamping—Heat Treating, vol. 10, no. 3, Mar. 1924, pp. 126-129, 6 figs. Points out that many steels not sufficiently hardened after first quenching frequently develop cracks if quenching is repeated, due to excessive hardening.

Quenching Diagrams for Carbon Steels in Relation to Some Quenching Media for Heat Treatment, H. J. French and O. Z. Klopsch. Am. Soc. Steel Treating—Trans., vol. 6, no. 3, Sept. 1924, pp. 251-294, 22 figs. Gives quenching diagrams for carbon steels containing from 0.25 to 1.25 per cent carbon; in these are shown relations between Rockwell hardness, microstructure, thermal transformations and cooling velocity determined at 720 deg. cent.; general relations between quenching diagrams and various quenching media for heat treatment. Bibliography.

The Calculation of Quenching Stresses in Steel by Using Direct Measurements, T. McL. Jasper. Engineering, vol. 138, no. 3062, Sept. 5, 1924, pp. 343-344, 6 figs. Description of a method of determining quantitatively internal stresses set up by quenching, and distribution of these stresses in cross-section of a series of heat-treated bars, together with a discussion of their relative importance.

The Quenching Bath. Machy. (Lond.), vol. 23; no. 597, Mar. 6, 1924, pp. 741-742, 1 fig. Facts concerning rate of cooling; effect of specific heat of bath.

Railway Shops. Heat Treatment of Steel. Ry. Jl., vol. 30, no. 10, Oct. 1924, pp. 22-24, 3 figs. Deals with handling of different tools, heat treatment of same in tool-tempering room of Atchison, Topeka & Santa Fe shops at Topeka, Kan.

Rear-Axle Shafts. Special Equipment Used in Heat Treating Rear Axle Main Shafts, H. O. Lang. Fuels & Furnaces, vol. 2, no. 12, Dec. 1924, pp. 1241-1245, 6 figs. Describes complete unit for heating, quenching and drawing rear-axle main shafts.

Salt Baths. Salt Baths, S. Tour. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 171-186, 2 figs. See also Am. Mach., vol. 61, no 14, Oct. 2, 1924, pp. 525-529, 2 figs. Discusses reasons for employing liquid heating mediums; design of furnaces and containers for melting salt baths; gives tables of composition of salt mixtures, salt baths for carbon tool steels, alloy tool steels and high-speed steels, etc.

Salt Baths and Containers for Hardening, Sam Tour. Am. Soc. Steel Treating—Trans., vol. 5, no. 1, Jan. 1924, pp. 7-19 and (discussion) 19-26, 7 figs. Discusses salt baths for heating of steel tools and parts and gives simple method of desulphurizing salt bath; decarburizing effects of chloride salt baths at 1600 deg. fahr., upon materials being treated; photomicrographs of steels heated in various types of salt baths; principles in regard to design of furnaces.

Shop for. Modernizes Heat Treating Shop, E. F. Ross. Iron Trade Rev., vol. 74, no. 8, Feb. 21, 1924, pp. 541-545, 6 figs. Rochester gear manufacturer installs new high-temperature continuous automatic electric furnace for hardening high-speed gear-cutting tools.

Springs. Heat Treatment of Steel Springs, J. K. Wood. Am. Mach., vol. 61, no. 12, Sept. 18, 1924, pp. 443-446. Commercial considerations; general requirements for a spring; spring steels and their compositions; coiling, forming, and heat treating helical and leaf springs.

Heat-treatment of Steel Springs, J. W. Rockefeller, Jr. Machy. (N. Y.), vol. 31, no. 1, Sept. 1924, pp. 4-5, 2 figs. Factors that affect heat treatment; recommended heat treatments. Deals also with heat treatment for alloy steel springs.

Temperature Distribution. Temperature Distribution in Steel Bodies Heated at a Constant Heat Potential, E. J. Janitzky. Am. Soc. Steel Treating—Trans., vol. 6, no. 5, Nov. 1924, pp. 619-622, 1 fig. Contentions set forth in previous article, entitled Characteristics of Heating Curves (published in Feb. 1924 issue of Trans.) are extended to temperature distribution in steel bodies heated at constant heat potential.

Tempering. Kinetics of Tempering Process in Steel (Zur Kinetik der Anlassvorgänge im Stahl), W. Fraenkel and E. Heymann. Zeit. für anorganische u. allgemeine Chemie, vol. 134, no. 2-3, Apr. 8, 1924, pp. 137-171, 8 figs. Experiments following temper reactions of carbon steel plunged into water by measuring resistance and density, showing that speed of tempering between 78 deg. and 360 deg. depends very much on temperature, etc.

Modification of Oil Tempering Bath Makes It a Success, E. Ogur. Fuels & Furnaces, vol. 2, no. 7, July 1924, pp. 647-649, 3 figs. Electric heaters at bottom of bath did not heat oil uniformly. Oil is now pumped through cylinder where it is brought to temperature by electrically heated grids.

Theories. The Heat Treatment of Steel, F. B. Foley. Fuels & Furnaces, vol. 2, no. 9, Sept. 1924, pp. 889-920 and 925-936, 20 figs. A treatise presenting latest theories for changes occurring in steel during its heat treatment. Discusses crystal structure of steel, hardening, hot working, annealing of hot-worked steel, drawing, case-hardening, heat treatment of case-carburized parts, quenching media, furnaces, and pyrometry.

Turbine Blading. Heat Treatment of Nickel Steel Turbine Blading, Carlos Bean. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 3, Aug. 1924, pp. 494-512, 6 figs. Determination of critical temperature of nickel steel; electric furnace; forms of test specimens; results of various forms of heat treatment; method of forging blades.

Volume Changes During. The Changes of Volume of Steels During Heat Treatment, L. Aitchison and G. R. Woodvine. Iron & Steel Inst.—Advance Paper no. 1, for meeting Sept. 1924, 14 pp., 9 figs. Results of investigation to determine (1) whether lateral expansion and contraction of metal is equal to longitudinal, (2) whether any difference is produced in behavior of specimens cooled slowly in dilatometer as compared with those hardened in air outside instrument, and (3) effect of cooling steel from different temperatures.

STEEL, HIGH-SPEED

Akrit. Experience with Akrit (Erfahrungen mit "Akrit"), C. W. Drescher. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1087-1089, 7 figs. Details of efficiency tests made with akrit steel, a kind of stellite steel; use in cutting tools.

Applications. Cast Steel, High-Speed Steel or Stellite? (Gussstahl, Schnellstahl oder Stellit?), Staufer. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1079-1084, 6 figs. Discusses feeds and speeds, field of application of various steels, and lathe work.

Cast Tools. Casting High Speed Tools, J. M. Quinn. Iron Trade Rev., vol. 75, no. 3, Jan. 17, 1924, pp. 226-230, 6 figs. See also Automotive Industries, vol. 50, no. 1, Jan. 3, 1924, pp. 13-17. Methods and theories by two firms manufacturing tools cast to approximate size and shape; how properties of tools can be controlled.

Chromium in. The Nature of the Function of Chromium in High Speed Steel, E. C. Bain and

M. A. Grossmann. Am. Soc. Steel Treating—Trans., vol. 6, no. 4, Oct. 1924, pp. 430-442, 17 figs. Results of measurement of effect of heat treatment upon hardness, impact strength and volume change in case of four high-tungsten steels; data, in some measure, reveal function of chromium in high-speed steel; photomicrographs show principal structural changes responsible for effect of heat treatment upon properties.

Cobalt and Vanadium Additions. The Influence of Cobalt and Vanadium on the Properties of High-Speed Steel (Beitrag zur Kenntnis des Einflusses von Kobalt und Vanadin auf die Eigenschaften von Schnellarbeitsstahl), W. Oertel and F. Pölzguter. Stahl u. Eisen, vol. 44, no. 39, Sept. 25, 1924, pp. 1165-1169, 14 figs. partly on supp. plate. Performance tests with high-speed tool steels alloyed with tungtesn and molybdenum; influence of tungsten and vanadium; tests with annealed chisels; hardness tests; melting points; investigation of structure.

Cutting-Tool. Influence of Ledeburite Structural Elements in the Production and Treatment of Cutting Steels (Der Einfluss der ledeburitischen Gefügebestandteile bei der Erzeugung und Behandlung von Dreh- und Schnittstählen), F. Rapatz. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute (Werkstoffausschuss), no. 41, Apr. 4, 1924, 7 pp., 13 figs. See also Stahl u. Eisen, vol. 44, no. 38, Sept. 18, 1924, pp. 1133-1138, 2 figs. Details of ledeburite steels, composition and size of net structure, decrease of hardening capacity by overloading with alloy metals, effect of velocity of solidification, etc.

Forging and Tempering. Forging and Tempering High-Speed and Carbon Tool Steels. Ry. Rev., vol. 75, no. 8, Aug. 23, 1924, pp. 282-283. Tool standards of Atchison, Topeka & Santa Fe Ry. are maintained by instructions in regard to proper methods for various classes of work.

Hardening. Difficulties in Hardening High-speed Steel. Machy. (Lond.), vol. 31, no. 630, Oct. 23, 1924, pp. 102-103, 1 fig. Experiments indicate that mere heating of some makes of high-speed steel to certain temperatures, and cooling, will not harden them; and that some steels will remain soft when heated to so-called hardening temperature in presence of CO gas and cooled in oil.

Hardness, Brinell and Rockwell. Comparison of Brinell and Rockwell Hardness of Hardened High Speed Steel, S. C. Spalding. Am. Soc. Steel Treating—Trans., vol. 6, no. 4, Oct. 1924, pp. 499-504, 6 figs. Steels were treated under varying temperatures and both Rockwell and Brinell hardness numbers were obtained; these are tabulated and shown in accompanying curves.

Nature of. On the Nature of High-Speed Steel, M. A. Grossmann and E. C. Bain. Iron & Steel Inst.—Advance Paper no. 6, for meeting Sept. 1924, 24 pp., 23 figs. partly on supp. plates. Account of physical phenomena occurring in high-speed steel from time of casting homogeneous melt to production of hardened tools, so far as changes in nature, amounts, and distributions of well-known constituents of such steels are concerned.

Properties and Treatment. High Speed Steel, A. R. Page. Birmingham Met. Soc.—Jl., vol. 8, no. 10, pp. 447-463 and (discussion) 463-468, 14 figs. partly on supp. plate. Composition; theory of high-speed steel; microstructure; heat treatment; testing.

High-Speed Steels and Cutting Steels (Schnellstahl und Schneidmetall), F. Rapatz. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1076-1078, 5 figs. Discusses properties, hardness, resistance and toughness, structure of hardened steels, etc.

STEEL INDUSTRY

Canada. See IRON AND STEEL, Canadian Industry; IRON INDUSTRY, Canada.

Nova Scotia. See COAL INDUSTRY, Nova Scotia.

Power in. See IRON INDUSTRY, Power in.

Sheet Steel. Sheet Steel Industry, W. S. Horner. Blast Furnace & Steel Plant, vol. 12, no. 7, July 1924, pp. 319-325. Address of president of Nat. Assn. Sheet and Tin Plate Mfrs. before second annual meeting of sheet steel executives at White Sulphur Springs, W. Va., May 13, 1924.

U. S. Steel Corpn., 1923. Prosperous Year of U. S. Steel Corporation. Iron Age, vol. 113, no. 13, Mar. 27, 1924, pp. 937-940, 1 fig. See also Iron Trade Rev., vol. 74, no. 13, Mar. 27, 1924, pp. 843-845. Company's 22d annual report shows large increase in production and earnings; heavier payroll and larger number of employees. Part of report dealing with subject of employees and wages.

Western States. Steel Industry Expands on Coast, Don Partridge. Iron Trade Rev., vol. 74, no. 1, Jan. 3, 1924, pp. 40-44, 7 figs. Demand for finished products for export during war and inability of eastern mills to supply material created incentive to produce steel in western states; local market absorbs output.

STEEL MANUFACTURE

Acid Bessemer. Acid Bessemer Practice in Sweden. Iron Age, vol. 114, no. 11, Sept. 11, 1924, pp. 637-638, 4 figs. Process carried out without final additions; converters distinctly unique; heat balance and composition of iron and steel. Abstract from article by R. von Seth in Jernkontorets Annaler, no. 1, 1924.

Acid Charge, Sulphur Content of. The Sulphur Content of the Acid Charge, J. H. Whiteley. West of Scotland Iron & Steel Inst.—Jl., vol. 31, part 3, Dec. 1923, pp. 42-47 and (discussion) 48-51. Notes relating to its variability during the process.

Alabama. Steel Making in Alabama, Jas. Bowron. Min. & Metallurgy, vol. 5, no. 215, Nov. 1924, pp. 522-525. History of development; first successful steel made in 1890; first successful steel plant; other developments.

Alloy Steel. Manufacturing and Heat Treating Alloy Steel, M. A. Grossmann. Iron Trade Rev., vol. 75, nos. 3 and 4, July 17 and 24, 1924, pp. 168-172 and 215-218, 9 figs. July 17: Development of alloyed steel industry, uses of alloy steels, and manufacturing methods. July 24: Factors influencing heat treatment.

Austria. Böhler Steel, H. Obermeyer and A. L. Greene. Blast Furnace & Steel Plant, vol. 12, no. 6, June 1924, pp. 281-284, 4 figs. Practice and equipment of steel works of Böhler Bros. & Co. in Austria.

Basic. Examination of Metallurgical Processes in the Basic Process According to the Flame Gases (Beurteilung der metallurgischen Prozesse beim Thomasverfahren nach den Flammengasen), G. Bulle. Stahl u. Eisen, vol. 44, no. 1, Jan. 3, 1924, pp. 9-11 and (discussion) 11-14, 8 figs. Flame gases in open-hearth and basic processes; practical examples with Thomas converter; conclusions; measuring device.

Basic Open-Hearth. See STEEL, Oxygen and Red Shortness.

Basic Steel, Metal-Mixer Practice for. Metal Mixer Practice and Basic Steel Making, T. P. Colclough. Chem. Age (Lond.), vol. 10, no. 246, Mar. 1, 1924, pp. 18-19. Advantages derived from use of mixer. Used as preliminary refining furnaces, limestone, and oxide of iron, in form of iron ore or tap cinder, being charged as required, and in this way a large proportion of

impurities is removed; effects of this purification of pig iron on operation of open-hearth furnaces.

Bessemer and Basic Processes. An Investigation of the Bessemer and Basic Processes (En studie över bessemer- och thomasprocesserna), R. von Seth. Jernkontorets Annaler, vol. 108, no. 1, 1924, pp. 1-93, 45 figs. Chemical transformations, heat generation and absorption, and temperature variations during both processes are carefully studied and recorded in numerous tables and diagrams.

Blast-Furnace Process. Effect of Sulfur on Blast-furnace Process, T. L. Joseph. Am. Inst. Min. & Met. Engrs.—Trans., Advance Paper no. 1374-S, Sept. 1924, 11 pp., 3 figs. Points out distribution of this impurity in blast-furnace materials and indicates how its presence alters composition, quantity, and free-running or critical temperature of slag, and relation between these factors, fuel economy, and cost of iron. Pub. by permission U. S. Bur. Mines.

Blast Furnaces. See BLAST FURNACES.

Chemical Dissociation. Importance of Dissociation of Chemical Compounds in Steel Making, J. Kent Smith. Chem. & Met. Eng., vol. 30, no. 2, Jan. 14, 1924, pp. 49-50. Observations on use of carbonless alloys for introducing alloying metal into steel show significance of chemical dissociation to metallurgists.

Cost and Practice Chart. The A. I. and S. E. E. Iron and Steel Cost and Practice Chart. Iron & Steel Engr., vol. 1, no. 3, Mar. 1924, supp. loose folder containing cost data on coke ovens, blast furnaces, open hearth, blooming mill and electric power, compiled by B. R. Shover.

Electric and Open-Hearth Processes. Quality of Electric and Open-Hearth Steels, B. E. L. de Maré. Iron Age, vol. 113, no. 5, Jan. 31, 1924, pp. 379-381. Metallurgical conditions during settling-up period compared; basic and acid slags; factors favoring clean steel.

Electric-Furnace. Progress in the Production of Electric Steel (Die Fortschritte der Elektrostahlerzeugung), F. Sommer. Berichte der Fachausschüsse des Vereins deutscher Eisenhüttenleute, Stahlwerksausschuss, report no. 77, Jan. 30, 1924, 18 pp. including discussion. Statistical data; arc and induction furnaces; economic and metallurgical advantages.

See also ELECTRIC FURNACES, Acid; Steel.

High-Quality Steel. Fundamentals Essential to Improved Quality Steel Production, Em. Gathmann. Am. Soc. Steel Treating—Trans., vol. 5, no. 2, Feb. 1924, pp. 158-168, 4 figs. Fundamentals essential to high-quality steel production and certain improved ingot molds and appliances, whereby tonnage production of sound steel has been made possible and practicable; in author's belief, one of fundamentals is use of big-end-up or inverted pyramidal ingot, in combination with other fundamental practice as described in detail.

Molybdenum as Deoxidizer. See MOLYBDENUM, Deoxidizer, Use as.

Open-Hearth-Furnace. Absorption of Sulfur from Producer Gas in Open-hearth Furnaces, J. H. Nead. Am. Inst. Min. & Met. Engrs.—Trans., no. 1298-S, Feb. 1924, 10 pp., 2 figs. Results obtained from two Armco ingot-iron heats; absorption occurs during melting-down stage.

Ordnance Steel. Making Steel for Ordnance Use, J. B. Rhodes. Iron Trade Rev., vol. 74, no. 22, May 29, 1924, pp. 1429-1430 and 1433. Points out that reduction of iron oxide to minimum is essential; sulphur and phosphorus should be eliminated; steel quality affected by slag; shop-practice instructions are suggested. (Abstract.) Paper presented before Am. Iron & Steel Inst. See also Forging—Stamping—Heat Treating, vol. 10, no. 10, Oct. 1924, pp. 380-383.

Rate of Cooling in Ingot Molds. Effect on Steel of Variations in Rate of Cooling in Ingot Molds, W. J. Priestley. Am. Instn. Min. & Met. Engrs.—Trans., no. 1236-S, Feb. 1924, 56 pp., 49 figs. Shows, by practical experiments, how rate of cooling steel in mold governs ingotism, segregation, formation of dendrites, and distribution of intergranular material, and resulting effect these conditions have on physical qualities of steel before annealing, after annealing, and after forging. How structure of steel is affected by design of mold and method of pouring.

Thomas Process. The Future of the Thomas Process (Vue sur l'avenir technique du procédé Thomas), M. Platon. Revue de Métallurgie, vol. 21, no. 10, Oct. 1924, pp. 628-633. Comparison of quality of open-hearth and Thomas steels; discusses oxygen in steels, difficulties of Thomas operation, and bettering of blowing arrangements.

STEEL WORKS

Bethlehem, Pa. Brief Description of the Bethlehem Steel Co.'s Plant. Min. & Metallurgy, vol. 5, no. 208, Apr. 1924, pp. 168-171, 4 figs. Divisions of plant; railroad facilities; power plants; blast-furnace department; open-hearth and bessemer departments; rolling mills, foundries and forge departments; machine shops, etc.; products of plant.

Blast-Furnace Gas Utilization. The Importance of Blast Furnace Gas for the Heat Economy of British Iron and Steel Works, R. Herzfeld. Eng. Progress, vol. 5, no. 7, July 1924, pp. 121-127, 3 figs. Discusses use in Cowpers, by hoists and bells, by blowing engines, and balance available for power; cleaning of blast-furnace gas; use of gas engines for generating blast; etc.

See also BLAST-FURNACE GAS, Steel Works.

Boiler Plants. See BOILER PLANTS, Iron and Steel Industry.

Central-Station Power for. Power Service for the Steel Industry in the Pittsburgh District, Chas. R. Riker. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 442-445. Review of existing and potential relationship between central-station companies and steel industry.

Coal-Dust Firing in. See COAL DUST, Firing with.

Cold-Drawing Plants. Operates New Cold Drawing Plant, J. D. Knox. Iron Trade Rev., vol. 75, no. 7, Aug. 14, 1924, pp. 423-427, 8 figs. Modern works of Anchor Drawn Steel Co., at Latrobe, Pa., 38 miles east of Pittsburgh. Various departments are laid out for straight-line production; primary annealing of coils is executed in gas-fired lead pots; description of cold-drawing process.

Developments, 1923. Increase Mill Capacity in 1923, John D. Knox. Iron Trade Rev., vol. 74, no. 1, Jan. 3, 1924, pp. 50-53. Decline in open-hearth-furnace which began six years ago, is checked; sheet and strip mills lead in construction of new rolling units; extensive additions proposed.

Electric Drive. Electricity's Contribution to the Steel Industry, K. A. Pauly. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 9, Sept. 1924, pp. 831-839, 4 figs. Outline of processes involved in production of steel, followed by a discussion of characteristics of the various rolling mills and types of motors used to drive them. Considerations affecting choice of frequency. Author believes that greatest contribution of electricity to steel industry is providing a means for economically using waste gases from blast furnaces. Points out importance, as a conservation measure, of utilization of blast-furnace gas and other sources of by-product power.

Electrification of Tata Iron Works at Jamshedpur, India, S. Ghosh. Iron & Steel Engr., vol.

1, no. 10, Oct. 1924, pp. 545-552, 30 figs. Details of electrical machinery and equipment installed.

Electrifying Ten-Inch Merchant Mill, M. J. Wohlgemuth and M. H. Morgan, Jr. Elec. Wld., vol. 84, no. 10, Sept. 6, 1924, pp. 465-468, 6 figs. How electric drive replaces engine drive at McKeesport, Pa., works of Firth-Sterling Steel Co., to produce cutlery without marking and without reheating. Details of installation and control.

Inland Steel Electrically Operated, F. J. Crolius. Blast Furnace & Steep Plant, vol. 12, nos. 2 and 3, Feb. and Mar. 1924, pp. 90-93 and 142-147, 8 figs. Feb.: By-product coke plant and replacement of steam-driven units by electrical equipment at Indiana Harbor plant of Inland Steel Co. Mar.: Elecrtrical equipment in various departments of the two plants.

Electric Power Stations for, Automatic. Automatic Electric Stations for Steel Mills, C. Lichtenberg. Iron & Steel Engr., vol. 1, no. 5, May 1924, pp. 252-256, 6 figs. Review indicating briefly operation of a typical automatic station and application of some of the equipments. Mentions several unique designs which are especially adapted for steel-mill service.

Electrical Equipment. Electrical Engineering as a Leading Factor in the Development of Modern Steelworks, W. Geyer. Iron & Coal Trades Rev., vol. 109, no. 2943, July 25, 1924, pp. 153-154. Discusses electric motors, cranes and transporters, auxiliary machines; power production, compressed-air supply, rolling mills, steel production in electric furnaces. Abstract of paper read before World Power Conference.

The Rehabilitation of Steel Mills, J. M. Moore and H. M. McLain. Elec. Jl., vol. 21, no. 9, Sept. 1924, pp. 424-427, 7 figs. Points out advantages of electrification and necessity for formulating definite plan for rehabilitation of existing plant equipment.

Fuel Economy in. See FUEL ECONOMY, Steel Works.

Furnaces. See FURNACES.

Gas Engines in. See GAS ENGINES, Steel Works.

Granite City, Ill. Expanding from Kitchen Ware to Ingots, G. L. Lacher. Iron Age, vol. 113, no. 11, Mar. 13, 1924, pp. 773-778, 8 figs. Latest additions to Granite City works of Nat. Enameling & Stamping Co. include plate mill, regenerative-type slab-heating furnace and large sheet plant.

Interconnection. See CENTRAL STATIONS, Interconnection with Steel Mills.

Italy. The Lombardi Iron and Steel Works. Iron & Coal Trades Rev., vol. 108, no. 2915, Jan. 11, 1924, pp. 50-51, 19 figs. partly on pp. 61-64. Describes Sesto San Giovanni, Milan, Vobarno, and Dongo works of Società Anonima Acciaierie e Ferriere Lombarde. See also description of Sesto San Giovanni works in Foundry Trade Jl., vol. 29, no. 388, Jan. 24, 1924, pp. 71-74, 5 figs.

Works of Acciaierie Elettriche Cogne Girod in Aosta (Gli stabilimenti della Soc. Anonima "Acciaierie Elettriche Cogne Girod," Aosta), F. Giolitti. Metallurgia Italiana, vol. 16, no. 10, Oct. 1924, pp. 438-445, 10 figs. partly on supp. plates. Details of Heroult furnaces, rolling-mill equipment, gas heating furnaces, annealing furnace, and other equipment.

Works of Ansaldo Cogne Company, Aosta (Notizie sugli impianti della Soc. Anonima "Ansaldo Cogne" in Valle di Aosta), G. Brezzi. Metallurgia Italiana, vol. 16, no. 10, Oct. 1924, pp. 431-438, 8 figs. Details of mines and mining operations, hydroelectric plants, and electric steel works and its equipment.

Lighting. Steel Works Lighting, D. W. Blakeslee. Iron & Stel Engr., vol. 1, no. 3, Mar. 1924, pp. 111-115. Design, installation, and maintenance of lighting systems in steel and iron works.

Lubrication in. Lubrication in the Steel Industry. Lubrication, vol. 10, nos. 5 and 7, May and July 1924, pp. 49-60 and 73-84, 37 figs. May: Discusses lubrication of equipment employed in smelting and refining, viz., blast furnace, mixer, Bessemer converters, open-hearth furnaces, and electric furnace. July: Soaking pits, rolling mills, lubrication, accessory equipment, and power equipment.

Motors for. See ELECTRIC MOTORS, A.C., Synchronous.

Oil Reclamation in. See LUBRICATING OILS, Reclamation.

Open-Hearth, Car Upkeep. Reducing Open Hearth Car Upkeep, C. L. Newby. Blast Furnace & Steel Plant, vol. 12, no. 7, July 1924, pp. 331-333, 7 figs. Anti-friction bearings now an important factor in production.

Open-Hearth Furnaces. See OPEN-HEARTH FURNACES.

Operation Problems. Problems of Steel Mill Operation, A. J. Whitcomb. Industrial Engr., vol. 82, no. 9, Sept. 1924, pp. 408-416, 456 and 457, 25 figs. Involves use of electrical and mechanical power-drive equipment, together with tendencies in power generation, distribution and application.

Pig-Iron Mixer. Thermal Study of a Cylindrical Pig-Iron Mixer (Etude thermique d'un mélangeur), J. Welter. Chaleur & Industrie, vol. 5, no. 47, Mar. 1924, pp. 105-109, 3 figs. Results of study carried out at large steel works in the Saar during 1922, following temperature losses of pig iron from tap hole to converter; knowing exact temperature of pig before entering and after leaving mixer, attempt was made to assemble for given period all elements influencing thermal state of this apparatus, and to construct thermal balance showing relative value of diverse factors.

Power Organization. Power Organization in the Steel Industry, B. Bannister and F. M. van Deventer. Mech. Eng., vol. 46, no. 5, May 1924, pp. 248-250. Author shows by comparison that value of fuels used and complexity of problems incident to operation of power system of representative steel works are of greater magnitude than for representative central station; these facts warrant existence of highly qualified organization for steel company in nature of power department; description of such organization and enumeration of benefits which should result.

Power Plant. See STEAM POWER PLANTS, Steel Works.

Rolling Mills. See ROLLING MILLS.

Sweden. Bofors.—The Famous Swedish Steel Works. Forging—Stamping—Heat Treating, vol. 10, no. 3, Mar. 1924, pp. 119-121, 7 figs. Details of Bofors work, founded in 1646, for making fine steel and guns; includes two blast furnaces, steel works with 3 open-hearth furnaces, rolling mills, steel foundry, pig-iron and brass foundry, laboratory and testing department, pressing and forging departments, machine shops, etc.

Sweden's Largest Industrial Company, A. B. Sloane. Iron Age, vol. 114, no. 13, Sept. 26, 1924, pp. 751-754, 9 figs. Stora Kopparbergs Bergslags Aktiebolag (Big Copper Mountain's Min. Co.), abbreviated "Bergslaget," world's oldest enterprise, was organized in thirteenth century and includes a dozen of the leading indus-

tries of Sweden. Extent of company's activities and welfare work.

Temperature Control. See PYROMETRY, Steel-Works.

STELLITE

[See also IRON ALLOYS, Stellite and Similar.]

Properties. The Hard Metal "Stellite" (Das Hartmetall "Stellit"), A. Märkle. Maschinenbau, vol. 3, no. 28, Nov. 27, 1924, pp. 1078-1079. Discusses principal properties, proper treatment, working, uses, and production of tools and their efficiency.

Tools. See TOOLS, Stellite.

STEREOAUTOGRAPHS. See MAPPING, France.

STEREOPHOTOGRAPHY. See MAPPING, Aerial.

STEREOPLANIGRAPH. See SURVEYING, Photographic.

STEREOPTICONS

Lantern Slides. See LANTERN SLIDES.

STEREOTOPOGRAPHY. See SURVEYING, Stereotopography.

STERILIZERS

Hospital. Sterilizers, E. W. Riesbeck. Domestic Eng. (Chicago), vol. 106, no. 12, Mar. 22, 1924, pp. 27-32, 4 figs. Operating principles, connections, etc., of utensil, instrument, water, dressing, and bed-pan sterilizers used in hospitals.

STETHOSCOPES

Electrical. "The Stethophone," An Electrical Stethoscope, H. A. Frederick and H. F. Dodge. Bell System Technical Jl., vol. 3, no. 4, Oct. 1924, pp. 531-549, 11 figs. Acoustic stethoscopes; early development of electrical stethoscope; description and summary of applications and limitations of a new form of electrical stethoscope.

STOKERS

Automatic. Mechanical Automatic Stokers. Southern Engr., vol. 40, no. 5, Jan. 1924, pp. 74-83, 23 figs. Necessity of mechanical stoker from standpoint of capacity and economy; several types of stokers.

Automatic Kiln. Further Development of an Automatic Kiln Stoker, J. D. Martin. Am. Ceramic Soc.—Jl., vol. 7, no. 12, Dec. 1924, pp. 878-884 and (discussion) 884-888. Describes practical experiences with stoker installation and savings effected; low grade of coal is burned in stoker.

Control of. The Control of Power Production, Chas. L. Hubbard. Factory, vol. 33, no. 5, Nov. 1924, pp. 667-670, 688, 692, and 696, 17 figs. Stokers and forced-draft equipment.

Developments. Activity in Stoker Field Shows Results, Jos. G. Worker. Power Plant Eng., vol. 28, no. 23, Dec. 1, 1924, pp. 1196-1198, 5 figs. Use of longer stokers and water walls have increased boiler output; better heat utilization shown.

Early History of. The Early History of Mechanical Stoking, D. Brownlie. Combustion, vol. 10, nos. 1 and 5, and vol. 11, no. 3, Jan., May, and Sept. 1924, pp. 41-47, 342-346, and 202-206, 17 figs. Jan.: Discussion of developments prior to James Watt's patents of 1785. May: James Watt's smoke preventer of 1785, first embryonic mechanical stoker. Sept.: Period to 1816 including work of Robertsons, Tindall, Hawkins and Dawson, and Gregson.

Efficiency, Computation of. Computing Guaranteed Stoker Efficiency, H. F. Gauss. Power, vol. 59, nos. 21 and 22, May 20 and 27, 1924, pp. 813-815 and 858-860, 4 figs. May 20: Computing stoker efficiency for given fuel, with discussion of various factors entering into problem; typical examples and convenient charts to facilitate work. May 27: Deals with unaccountable losses, moisture in coal, available hydrogen content, and combustible matter in ash.

Electric Drive for. Motors and Control for Stoker Drive, R. Kelly. Elec. Jl., vol. 21, no. 5, May 1924, pp. 221-224, 7 figs. Discusses factors in selection of motors and control equipment.

What Type of Stoker Drive Should Be Used? Power Plant Eng., vol. 28, no. 7, Apr. 1, 1924, pp. 374-377, 4 figs. Relative advantages of engine, turbine, a.c. and d.c. motor drives.

Hand. Hand Stokers Reduce Operating Labor. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 47-49, 9 figs. Field of application; general description of action; details of construction of different makes.

Lubrication of. Lubrication of the Automatic Stoker. Lubrication, vol. 10, no. 8, Aug. 1924, pp. 85-96, 11 figs. Discusses types of stokers, stoker drives, stoker lubrication and construction, design, and operating features involved.

Planning Installations. Planning Modern Stoker Installations, Jos. G. Worker. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1924, pp. 559-561, 7 figs. Résumé and analysis of combustion problem; includes review of modern stoker installations.

Savings with Small Boilers. Mechanical Stoker Savings with Small Boilers, R. June. Power House, vol. 17, no. 16, Aug. 20, 1924, pp. 23-24, 2 figs. Reduction in costs of producing steam, increase in efficiency and availability of cheaper grades of fuel, among factors which prove installation economical.

Speed Control. Drive and Speed Control of Mechanical Stokers. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 52-55, 8 figs. Speed-controlling devices are often actuated by air-supply mechanism to give correct proportioning of air to fuel.

Steam Engine as Drive. The Steam Engine as a Stoker Drive. Power Plant Eng., vol. 28, no. 19, Oct. 1, 1924, pp. 1000-1002, 4 figs. Slow speed, continuous range and automatic torque-speed adjustment are among desirable characteristics.

Types. Mechanical Stokers for the Power Plant. Power Plant Eng., vol. 28, no. 1, Jan. 1, 1924, pp. 56-62, 24 figs. Descriptions of stoker types which meet requirements of present-day steam production.

See also BOILER FURNACES, Design.

Underfeed. How the Modern Underfeed Stoker Works, and Why, Jos. G. Worker. Coal Age, vol. 25, no. 10, Mar. 6, 1924, pp. 347-349, 5 figs. See also Combustion, vol. 10, no. 3, Mar. 1924, pp. 206-208, 4 figs. Number of underfeed stokers has increased rapidly; what special features in design have been introduced for burning Western coals; progress of ash in fire must be given serious consideration. (Abstract.) Paper read before Chicago Section, A. S. M. E.

How to Regulate Underfeed Stokers, J. E. Richardson. Power, vol. 60, no. 11, Sept. 9, 1924, pp. 401-402, 1 fig. Practical points on reducing combustible in ash, balancing stack loss against ashpit loss, proper speed for clinker grinders and other conditions bearing on efficiency of combustion.

Underfeed Stokers, J. G. Worker. Refrig. Eng., vol. 10, no. 8, Feb. 1924, pp. 295-304 and (discussion) 304-305 and 309, 21 figs. Description of some types (both multiple- and single-retort)

now being used in United States; performance and coal conditions; height to set boilers.

Underfeed Stokers and Economy in Coal, Jos. G. Worker. Mgmt. & Adminstration, vol. 7, no. 3, Mar. 1924, pp. 287-290, 7 figs. Development, operating principles, and applications to power production. (Abstract.) Address before Chicago Section of A. S. M. E.

Water-Tube and Cylindrical Boilers. Mechanical Stokers and Boiler Furnaces. Eng. & Boiler House Rev., vol. 37, no. 11, June 1924, 18 pp. between pp. 397-422, 19 figs. Notes on present-day practice describing some leading types in use for water-tube and cylindrical boilers.

STONE, CRUSHED

Industry, Electricity Applications in. The Application of Electricity in the Crushed Stone Industry, E. W. Pilgrim. Rock Products, vol. 27, no. 5, Mar. 8, 1924, pp. 83-86, 5 figs. Application to lighting, conveyors, crushers, quarry machines and transportation.

STORAGE BATTERIES

Cadmium Testing of. Cadmium Testing of Storage Batteries. Power Engr., vol. 19, no. 217, Apr. 1924, pp. 143-144. Explanation of reasons for and practice of cadmium testing.

Central Stations. Semi-Automatic Storage Battery Installation (Une installation semi-automatique de batterie d'accumulateurs), V. Candie. Revue Générale de l'Electricité, vol. 15, no. 25, June 21, 1924, pp. 1166-1169, 7 figs. Describes storage-battery plant of Société du Gaz of Nice for peak load during certain hours in winter, capacity 10,000 a.h.; details of arrangement and operation.

Charging. Battery Charging with Rectigon Rectifiers, E. W. Breisch. Elec. Jl., vol. 21, no. 4, Apr. 1924, pp. 155-159, 10 figs. Describes rectigon bulb and transformers; operation; describes portable and public-garage rectigons.

Charging Devices for Storage Batteries (Ladevorrichtungen für Akkumulatoren), R. Schwabe. Elektrotechnischer Anzeiger, vol. 41, nos. 84 and 85-86, May 24 and 28, 1924, pp. 425-428 and 433-435, 15 figs. Describes various types of apparatus for d.c. charging and rectifiers for a.c. made by Werner, Hydra Works, AEG.

Charging Equipment. Electric Truck Battery Charging Equipment, O. Sarvas. Elec. Jl., vol. 21, no. 4, Apr. 1924, pp. 136-139, 8 figs. Discusses battery equipment for industrial trucks, street trucks, and locomotives.

Drive for Vehicles. Storage Batteries for Economic Drive of Vehicles (Der elektrische Speicher als wirtschaftliche Antriebsquelle für Fahrzeuge), H. R. Müller. Fördertechnik u. Frachtverkehr, vol. 17, no. 22, Nov. 18, 1924, pp. 307-312, 14 figs. Use of storage batteries for driving locomotives and other track vehicles of large and small size, and for driving trackless vehicles of all kinds.

Edison. Maintaining Edison Car Lighting Batteries. Ry. Elec. Engr., vol. 15, no. 8, Aug. 1924, pp. 253-254, 6 figs. Methods used on Union Pacific are highly effective and labor required is reduced to minimum.

Electrolytes. Effect of Certain Impurities in Storage Battery Electrolytes, G. W. Vinal and F. W. Altrup. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 313-320, 12 figs. Extension of work carried out at Bur. of Standards where new method for measuring rate of sulphation of storage-battery plates was devised, consisting of periodic weighings of plates suspended in electrolyte; results of experiments indicate that reactions of manganese compounds in battery are somewhat different from previously accepted theories.

Grid Casting. See CASTING, Lead Alloys.

Improvements. Electric Storage Batteries According to Recent Patents (Les accumulateurs électriques d'après les brevets récents), L. Jumau. Revue Générale de l'Electricité, vol. 16, nos. 20 and 21, Nov. 15 and 22, 1924, pp. 790-798 and 827-836, 44 figs. Discusses lead storage batteries, dealing with electrodes, active mass, accessories and mounting. Reviews improvements in iron-nickel and other batteries. Describes various new applications of storage batteries.

Lead. Lead Storage Batteries without Sulphate (Accumulateur au plomb insulfatable), Ch. Féry. Académie des Sciences—Comptes Rendus, vol. 179, no. 21, Nov. 24, 1924, pp. 1153-1156, 1 fig. Proves by reversible reaction of lead accumulators that no lead sulphate is formed. Particulars of new battery retaining 83 per cent of charge after four months.

Maintenance and Operation. See RAILWAY SIGNALING, Storage-Battery Maintenance and Operation.

Mine-Locomotive. How to Proportion a Locomotive Storage Battery, B. B. Minnium. Modern Min., vol. 1, no. 4, Nov. 1924, pp. 101-103. Detailed explanation of method used in approximating size of battery necessary to perform certain amount of work.

Rectifiers. See RECTIFIERS.

STREAM FLOW

Measurement. Records of Stream Flow and Methods of Obtaining Them, C. C. Covert. Assn. Chinese & Am. Engrs.—Jl., vol. 5, no. 6, June 1924, pp. 1-8, 9 figs. Discusses location of gaging stations, types of gages, making discharge measurement, measuring small stream, obtaining winter record.

Using Observations Made with Movable Barrage Dams for Determining the Supply Diagram (Utilisation des Observations faites aux Barrages à Fermettes pour la détermination du diagramme des débits), F. Charles. Revue Universelle des Mines, vol. 3, no. 1, series 7, July 1, 1924, pp. 26-34, 11 figs. Applies this method for determining flow of River Meuse.

STREAM POLLUTION

Control. Progress Report on Agencies for the Control of Pollution by Industrial Wastes. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 628-648. State and federal authorities on stream pollution control; joint undertakings along sanitary lines, within separate states; European boards for control of stream pollution; international aspects of problem of pollution of waters; conferences on industrial wastes pollution; legislation.

Effects on Stream Life. Effects of Sewage and Various Trades Wastes on Stream Life, W. Rushton. Surveyors & Mun. & County Engr., vol. 65, no. 1673, Feb. 8, 1924, pp. 179-181. Life contents of a stream; how sewage affects a stream; effects of distillery wastes, and jam works, tinplate works, paper mill, and gasworks effluents.

Industrial Wastes. Conference on Pollution of Streams, Especially with Reference to Pollution Due to Industrial Waste. Engrs. & Eng., vol. 41, nos. 1, 2, and 3, Jan., Feb., and Mar. 1924, pp. 11-17, 40-50, and 74-87. Held at Engrs. Club of Phila., Oct. 16, 1923. Contains following papers: Government Control of Pollution, C. A. Emerson, Jr.; Stream Line Filters, G. W. Fuller; Stream Pollution as Affecting Navigation, F. C. Boggs; Industrial Wastes in Relation to Water Supply, A. L. Fales; Coal Mine Drainage Contamination of Water Supplies, J. W. Ledoux; Effect of Pollution on Oyster Industry, C. E. Wheeler.

Recovering Pickling Acid Waste, R. M. Crawford. Iron Trade Rev., vol. 75, no. 15, Oct. 9, 1924, p. 948. Recovery of copperas from waste sulphuric acid pickling solutions, as a means for preventing pollutions of streams by pickle wastes, unattractive because unprofitable. Calcining to iron oxide yields blast-furnace material. Why pickling solution prevents streams from oxidizing impurities.

STREET CLEANING

Methods. Modern Street Cleansing, A. L. Thomson. Surveyor & Mun. & County Engr., vol. 65, no. 1693, June 27, 1924, pp. 603-605. Discusses hand and machine sweeping and flushing methods; data of street-cleaning systems in 18 towns.

Motor Vehicles for. Automobilizing the Street-Cleaning Machinery (Die Automobilisierung der Strassenreinigungsmaschinen), H. Frenssen. Städtereinigung, vol. 16, no. 18, Sept. 15, 1924, pp. 172-173, 4 figs. Details of various types of trucks for refuse collection, sprinkling, etc., for large towns.

The Motorization of Street Cleaning and Refuse Removal in Chicago, W. J. Galligan. Mun. & County Eng., vol. 67, no. 4, Oct. 1924, pp. 198-203, 4 figs. See also Pub. Wks., vol. 55, nos. 11 and 12, Nov. and Dec. 1924, pp. 334-336 and 378-380, 3 figs. Describes flushers, sweepers, tractors, trailers, caterpillars, and snow plows and loaders used.

Philadelphia. Municipal Street Cleaning in Philadelphia, C. A. Howland. Pub. Wks., vol. 55, nos. 10 and 11, Oct. and Nov. 1924, pp. 299-302 and 354-357, 9 figs. Cleaning methods employed, refuse collection, and disposal of refuse, new Harrowgate incinerator, etc.

Sprinklers, Tractor-Hauled. A Tractor-Hauled Street Sprinkler. Motor Transport (Lond.), vol. 39, no. 1015, Aug. 11, 1924, p. 182, 1 fig. Adaptable unit for municipal work; low capital cost makes attractive proposition for small local authorities.

STREET RAILWAYS

Attaching Span Wires to Buildings. Eliminating Poles in El Paso. Elec. Ry. Jl., vol. 63, no. 13, Mar. 29, 1924, pp. 499-500, 5 figs. European method of attaching span wires directly to buildings, which is being employed with marked success.

Car Equipment. Trends in Electric Railway Equipment, G. M. Woods. Elec. Ry. Jl., vol. 64, no. 1, July 5, 1924, pp. 9-10, 7 figs. Smaller wheel sizes, double-end control, double trucks, four motors per car, lower weight per car, and smaller size motors are trends shown by motor sales.

Car Heating. See CAR HEATING.

Car Houses. See CAR HOUSES.

Car Lubrication. Lubricating Practice for Electric Cars. Elec. Ry. Jl., vol. 63, no. 20, May 17, 1924, pp. 763-766, 4 figs. Analysis of quantity of lubricant used, period of oiling, and methods of applying lubricants as found from a study covering 57 electric railway properties.

Car Maintenance. 217-728 Car-Miles per Pull-In, Robert M. O'Brien. Elec. Ry. Jl., vol. 63, no. 25, June 21, 1924, pp. 969-971, 5 figs. Well-organized system of inspection and repair has enabled New Orleans Public Service, Inc., in 3½ years to eliminate 95 per cent of pull-ins and cut maintenance costs to half.

Car Materials. New Materials in Car Body Construction, J. A. Dewhurst. Elec. Ry. Jl., vol. 64, no. 14, Oct. 4, 1924, pp. 549-552, 5 figs. Points out that development of steel-covered laminated wood panels has made possible construction of type of side girder which has strength and rigidity of steel and at same time gives better insulation, less noise, and reduced weight.

Car Shops. See RAILWAY REPAIR SHOPS, Street-Car.

Cars. Articulated Cars for Baltimore. Elec. Traction, vol. 20, no. 12, Dec. 1924, pp. 582-583, 3 figs. United Rys. & Elec. Co. adopts jointed 2-car units as result of studies on other properties.

Brooklyn's "Duplex Car" Placed in Service. Elec. Ry. Jl., vol. 63, no. 7, Feb. 16, 1924, pp. 252-255, 8 figs. Two-unit, three-truck car, 63 ft. 10 in. overall, built by Brooklyn-Manhattan Transit Corpn.; has novel center construction with weather-tight drum to permit free passage between the two sections.

Double-Truck Cars Weight 564 lb. per Seat. Elec. Ry. Jl., vol. 64, no. 2, July 12, 1924, pp. 49-50, 3 figs. Unique arrangement is made for separation of races on new side-entrance cars of Birmingham Elec. Co., Birmingham, Ala.; are of light-weight steel construction and seat 62 passengers.

Improvements in Motor Cars from the Viewpoint of Initial Cost, Upkeep and Consumption (Perfectionnements apportés aux voitures motrices au point de vue des dépenses de premier établissement, d'entretien et de consommation), H. Dubath. Industrie des Tramways, vol. 18, no. 214, Oct. 1924, pp. 392-419, 35 figs. Discusses design and construction, including chassis, suspension, ball and roller bearings, mechanical brakes, bodies, reduction of weight, etc.

Light Metal as a Material of Construction for Cars (Leichtmetall als Konstruktionsmaterial für den Waggonbau), G. Ehrhardt. Verkehrstechnik, no. 35a, Sept. 1924, pp. 403-406, 1 fig. Discusses possibility of using light metals, suitable alloys, advantages of light metals in car construction, and comparative cost.

New Chicago Multiple-Unit Cars Have Automatic Exit Doors. Elec. Ry. Jl., vol. 64, no. 20, Nov. 15, 1924, pp. 837-841, 8 figs. Describes new type cars of Chicago Surface Lines, designed to give maximum flexibility either as single units or in two-car trains; arranged for double-end operation and equipped with two 65-hp. motors per car mounted on maximum traction trucks.

Rear Exit Expedites Passenger Movement. Elec. Ry. Jl., vol. 63, no. 18, May 3, 1924, pp. 693-695, 5 figs. Describes one-man double-truck light-weight cars recently placed in service in Fort Wayne by Indiana Service Corpn.; rear exit and inclosed steps.

Reducing Weight of Rapid Transit Cars Saves $108,000 a Year, J. Lindall. Elec. Ry. Jl., vol. 64, no. 8, Aug. 23, 1924, pp. 269-274, 7 figs. Steps by which weight was reduced, carrying capacity increased and strength maintained in new rolling stock for East Boston service; electric door openers give good results.

Rider Comfort Features Interurban Car. Elec. Ry. Jl., vol. 63, no. 24, June 14, 1924, pp. 931-933, 2 figs. New type of car developed by Indiana Service Corpn. for intercity traffic; riding quality and passenger comfort first consideration in construction; simplicity of design of both interior and exterior, producing attractiveness; 50-passenger car weighs 51,700 lb.

Sacramento Modernizes. Elec. Traction, vol. 20, no. 8, Aug. 1924, pp. 351-352, 2 figs. Old California type city cars rebuilt into modern suburban equipment, for multiple-unit control in train service, by Sacramento Northern Ry.

Cars, Energy Consumption. Energy Consumption of Interurban Cars. Elec. Ry. Jl., vol. 63, no. 5, Feb. 2, 1924, pp. 171-173, 8 figs. Tests made to allocate energy used between cars of Detroit United Ry. and Detroit Street Ry. when operating on tracks of latter indicate average consumption of 120.4 watt-hr. per ton-mile; heater energy also measured.

Cars, German. New German Cars Have Unique Features. Elec. Ry. Jl., vol. 63, no. 15, Apr. 12, 1924, pp. 574-575, 3 figs. New cars added to rolling stock of Krefeld Street Ry. system, Germany; thin castings for truck side frames; special leaf springs; all bearings roller type; air for motors taken in at roof; doors on ball bearings. From Verkehrstechnik, Sept. 7, 1923.

Cars, Jolting of. Vertical Oscillation or Jolting of Street Cars (Das Nicken bei Strassenbahnwagen), F. Hartmann. Verkehrstechnik, no. 22, May 30, 1924, pp. 222-223, 5 figs. Discusses oscillation of cars due to unevenness of track and effect of position of center of gravity.

Cars, One-Man. A New Idea in One-Man Operation. Elec. Traction, vol. 20, no. 7, July 1924, pp. 293-295, 3 figs. Washington Ry. & Elec. Co. develops automatic step treadle for rear exit operation to gain stamp of public approval for one-man car.

Light-Weight Cars for Racine and Kenosha. Elec. Ry. Jl., vol. 64, no. 9, Aug. 30, 1924, pp. 313-315, 5 figs. New one-man equipment of Milwaukee Elec. Ry. & Light Co. is designed to meet needs of smaller cities and at same time give desirable riding qualities of double trucks.

One-Man Cars in Holland, P. M. Nieuwenhuis. Elec. Ry. & Tramway Jl., vol. 50, no. 1223, Feb. 8, 1924, pp. 71-74, 3 figs. Experiences and results at Arnhem.

Rear-Entrance, Front-Exit, One-Man Car in Toledo. Elec. Ry. Jl., vol. 64, no. 8, Aug. 23, 1924, p. 279, 4 figs. No difficulty has been found with loss of fares on double-truck cars without turnstiles on belt line.

Cars for Parcel Post Package Haulage. Electric Cars Haul Parcel Post Packages in Berlin, E. Kindler. Elec. Ry. Jl., vol. 64, no. 10, Sept. 6, 1924, p. 346, 2 figs. Trains have replaced horse-drawn vans with profit to post office department and to railway system.

Diesel-Engine Plant. See DIESEL ENGINES, Street-Car Power.

Illinois. Rehabilitated Property Attracts Increased Patronage. Elec. Ry. Jl., vol. 63, no. 15, Apr. 12, 1924, pp. 569-573, 6 figs. Extensive rehabilitation, accomplished in 5 months' time, has transformed bankrupt Aurora, Elgin & Chicago, Fox River Division, into a modern electric railway property; particulars of new cars and power facilities.

Japan and China. Electric Traction Progress in the Orient, I. Takano and H. M. Fleming. Elec. Traction, vol. 20, no. 2, Feb. 1924, pp. 68-69. Tokio Mun. Ry. decides to inaugurate package freight service; Japanese interurban properties to be improved; Pekin, China, will have modern street car system.

Line Practices. Line Practices on Pittsburgh Railways, H. A. Pharo. Elec. Ry. Jl., vol. 63, no. 12, Mar. 22, 1924, pp. 469-472, 6 figs. Discusses materials, construction, and equipment used by this large city system, together with maintenance and emergency organization employed.

London, England. Latest Developments on London's Street Car System. Elec. Traction, vol. 20, no. 7, July 1924, pp. 297-301, 5 figs. Cars are of double-deck type with covered roof, seating 78 passengers; describes Charlton car shops, blacksmith shop, wheel shop, magnetic brake shoes, machine and truck shop and Greenwich power station.

Marseilles, France. Street Railway Systems in Marseilles (Le Réseau des Tramways de Marseille), M. Bertrand. Industrie des Tramways, vol. 18, no. 214, Oct. 1924, pp. 372-383, 21 figs. Particulars of layout, rolling stock, car barns, tracks, overhead lines, electric welding, traffic, etc.

Noise Elimination. Elimination of Noise, C. L. Van Auken. Elec. Traction, vol. 20, no. 9, Sept. 1924, pp. 405-412, 13 figs. Deals with track, wheel, wheel and track, journal, brake, truck, gear, compressor, motor, body, roof, trolley and other noises in operation of street cars.

Operation in Medium-Sized Cities. The Operation of an Electric Railway in a Medium Sized City, A. H. Foster. Elec. News, vol. 33, nos. 14 and 17, July 15 and Sept. 1, 1924, pp. 58-60 and 54-55. How ingenuity and resourcefulness overcome difficulties met on smaller systems.

Overhead Equipment. Overhead Equipment, W. Nairn. Tramway & Ry. Wld., vol. 55, no. 30, June 19, 1924, pp. 303-304. Deals with materials and design of items of tramway overhead equipment based on experiences of past 28 yrs.; poles and pole fittings; insulation; trolley wires; percentage of scrap; shape of conductor; overhead line fittings; types of collectors and construction and trolley feed cables.

Overhead Trolley Suspension. Trolley Breaks Cut Over 70 Per Cent. Elec. Ry. Jl., vol. 64, no. 3, July 19, 1924, pp. 87-89, 4 figs. Investigations in Detroit into means of flexible suspension; drop forgings still used for overhead material; electric switches have been changed to power on type.

Pneumatic Body Suspension. The Holden Suspension. Elec. Ry. & Tramway Jl., vol. 50, no. 1219, Jan. 11, 1924, pp. 33-34 and 36, 5 figs. Description of a low-pressure system of pneumatic suspension suitable for all classes of vehicles (buses, trams and the like), placed on market by Holden Suspension Co., Ltd., Manchester, Eng.

Rail Crossings, Thermit-Welded. Thermit Welded Crossings for Tramways. Tramway & Ry. Wld., vol. 56, no. 25, Nov. 20, 1924, pp. 263-264, 3 figs. By its use rails of any British standard specification or section can be spliced at any angle, no expensive patterns required, and after fitting is finished Thermit weld is made and band of Thermit metal completely covers all joints of rails; result is a crossing in one solid piece. Greater economy effected.

Reconstruction. Rebuilding a Section of Street Railway at Milwaukee. Eng. News-Rec., vol. 92, no. 8, Feb. 21, 1924, pp. 310-312, 3 figs. Methods and equipment used in reconstruction of track and paving; reinforced-concrete paving general and special vibrolithic test section; labor-saving machinery.

Regenerative Braking. See BRAKING, Regenerative.

Scandinavia. Electric Street Railways in the Principal Scandinavian Cities. Teknisk Tidskrift, vol. 64, no. 47½, Nov. 22, 1924, pp. 205-226, 15 figs. Issue devoted to subject of electric street railways in Scandinavia containing articles by different authors, describing present systems and plans for extensions and discussing trolleys and ground currents.

Street Opening, Control of. Control of Street Openings and Methods of Restoration, W. Graves. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 296-297. Solution of problem, author believes, is based primarily on coöperation between city authorities and railway company, and putting into effect certain arrangements which are outlined.

Substations, Automatic. See SUBSTATIONS, Automatic.

Three-Car Articulated Trains. Detroit Operates New Three-car Articulated Train, A. C. Colby. Gen. Elec. Rev., vol. 27, no. 7, July 1924, pp. 441-448, 10 figs. Three-car articulated unit placed in operation on Woodward Ave. line by Dept. Street Rys., designed to handle heavy passenger traffic on this route.

Three-Car Articulated Train for Detroit, A. C. Colby. Elec. Ry. Jl., vol. 63, no. 10, Mar. 8, 1924, pp. 357-362, 12 figs. Articulated construction reduces weight and cost and also gives improved riding qualities; seating capacity is 140 passengers; many unusual features of design.

Track. Better Concrete Results from Field Tests. Elec. Ry. Jl., vol. 64, no. 3, July 19, 1924, pp. 85-87, 6 figs. Capital Traction Co. has improved quality of concrete pavement in Washington by careful measurement of quantities of materials used; track structure consists of T-rails on rock-ballasted chestnut ties.

Effects of Street-Car Tracks on Roadway and Its Surfacing (Die Wirkungen der Strasseneisenbahngleise im Strassenkörper und in seiner Oberflächenbefestigung), D. Sperber. Bauingenieur, vol. 5, no. 22, Nov. 25, 1924, pp. 732-735, 2 figs. Deals with elastic and rigid foundations, construction of joints, welding, corrugation on rail surfaces, method of constructing roadbed and tracks, etc.

Paving Troubles Along the Rail, W. S. Godwin. Elec. Ry. Jl., vol. 63, no. 3, Jan. 19, 1924, pp. 101-103, 9 figs. Discusses various causes of failure of bond between paving and rail under traffic, and suggests method for permitting rail movement while preserving bond and strengthening paving edge.

Rigid Track Experience in Kansas City, A. E. Harvey. Elec. Ry. Jl., vol. 64, no. 17, Oct. 25, 1924, pp. 730-731, 5 figs. Approximately 46 mi. of track built in solid concrete with various types of paving; both wood and steel ties have been used; thermit joints have stood up well.

Track Construction, C. F. Gailor. Elec. Ry. Jl., vol. 64, no. 13, Sept. 27, 1924, pp. 501-504, 5 figs. Use of T-rail in paved streets; modern practice in joint welding; advantages of adopting standard track design.

Track Maintenance and Reconstruction. Keeping Track Machinery "on the Job." Elec. Ry. Jl., vol. 63, no. 12, Mar. 22, 1924, pp. 463-469, 11 figs. How track maintenance and reconstruction are expedited by use of large variety of machine equipment, by Milwaukee Elec. Ry. & Light Co.

How New Orleans Is Rebuilding Track. Elec. Ry. Jl., vol. 63, no. 20, May 17, 1924, pp. 773-776, 21 figs. Aim has been a substantial structure that will last well in spite of poor drainage and unfavorable climatic conditions; special effort has been made to give mobility to track machinery.

New Rail on Old Steel Ties and Concrete. Elec. Traction, vol. 20, no. 8, Aug. 1924, pp. 366-368, 4 figs. How Cleveland Rys. renews track and utilizes old steel ties and concrete foundation; easy and economical renewal method developed.

Portable Pneumatic Equipment Reduces Track Reconstruction Cost, C. A. Elliott. Elec. Ry. Jl., vol. 63, no. 16, Apr. 19, 1924, pp. 613-615, 6 figs. Pneumatic tie tamping and pavement cutting tools used in reconstruction of one of Pacific Elec. Ry. Co.'s lines in downtown congested district of Los Angeles.

Traffic Congestion Relief, Chicago. Chicago Loop Rerouting Would Increase Capacity for Cars 30%. Elec. Ry. Jl., vol. 63, no. 18, May 3, 1924, pp. 683-687, 8 figs. Proposed plan for rerouting of street railway lines in downtown Loop district of Chicago to relieve traffic congestion.

Trolley Derailments. Trolley Derail Prevents Accidents, O. S. Lamb. Elec. Traction, vol. 20, no. 7, July 1924, p. 323, 2 figs. Kansas City, Kaw Valley & West. Ry. have constructed device which works in conjunction with order board, making it impossible for trainmen to proceed in disregard of orders.

Trolley Wires, Steel. Overcoming Current-Collection Troubles on Steel Wire, H. M. Robinson. Elec. Ry. Jl., vol. 63, no. 20, May 17, 1924, pp. 767-769, 3 figs. Investigations made at Fort Worth, Tex., where much of overhead construction is of this material, demonstrated superiority of trolley shoes under those conditions; methods of lubricating trolley wire.

STREETS

[See also PAVEMENTS; ROADS.]

Automobile Traffic. Adaptation of Streets to Motor Bus Traffic (Die Anpassung der Strassen an den Kraftwagenverkehr), E. Neumann. Verkehrstechnik, vol. 41, no. 46, Nov. 14, 1924, pp. 586-590, 3 figs. Provision of special roads for automotive traffic is recommended. Wide streets should be subdivided, refuge islands should be provided, and sharp curves eliminated.

Chicago, Improvement. See VIADUCTS, Double-Decked Street Improvement, Chicago.

Cleaning. See STREET CLEANING.

Lighting. See LIGHTING, Street.

Paving. See PAVEMENTS.

Planning. See CITY PLANNING, Highways and Traffic; Street Planning.

Widening. Street Widening Methods with Particular Reference to Distributing the Cost, H. Bartholomew. Mun. & County Eng., vol. 61, no. 1, July 1924, pp. 33-41. Discusses requisite legal authority, conditions in Toledo, Memphis, and Wisconsin, authority for proper appraisal of damages and determination of benefit assessments and districts, etc.

STREMMATOGRAPH. See RAILWAY TRACK, Stresses in.

STRESSES

After-Effect Phenomenon. Elastic After-effect, Elastic Hysteresis and Internal Friction (Ueber elastische Nachwirkung, elastische Hysteresis und innere Reibung), K. Bennewitz. Physikalische Zeit., vol. 25, no. 17, Sept. 1, 1924, pp. 417-431, 4 figs. Shows that after-effect phenomenon does not start from internal friction, but is an internal sublimation; after-effect hysteresis, and internal friction can therefore be traced back to recrystallization.

Elastic. Volume Changes in Elastically Loaded Bodies (Ueber die Volumenänderung eines elastisch beanspruchten Körpers), G. Masing. Zeit. für technische Physik, vol. 5, no. 10, 1924, pp. 430-433, 4 figs. Deduces a general relation between distribution of exterior forces and elastic volume change, with aid of principle of virtual displacement; no change in volume due to natural stresses.

Expansion. Tension Due to Expansion (Wärmespannungen), H. Winkel. Praktische Maschinen-Konstrukteur, vol. 57, nos. 26, 27, and 28, July 15, 22, and 29, 1924, pp. 369-371, 384-386, and 398, 11 figs. Develops fundamental formula for stresses due to temperature increase in member fixed at both ends so that natural expansion cannot take place. Application to non-uniform heating in hollow cylinders.

Internal. Internal Stresses Rendered Visible (Les tensions intérieures rendues visibles), A. Mesnager. Technique Moderne, vol. 16, no. 6, Mar. 15, 1924, pp. 161-171, 52 figs. Discusses method based on theory of polarization which permits accurate measurements of internal stresses of a solid; applications of method.

Links. The Stresses in Links, and Their Alteration in Length Under Load, A. J. S. Pippard and Chas. V. Miller. Instn. Mech. Engrs. Proc., vol. 2, no. 6, 1923, pp. 1153-1167, 7 figs. Calculations of alteration in length under load were made for several different shaped links which were afterwards tested to justify method;

solution is given for general case of link having only one axis of symmetry.

Machine Parts. Optical Investigation. See MACHINERY, Stress in Parts.

Measurement of. See TELEMETERS.

Permissible. Factor of Safety and Permissible Stresses (Säkerhetsgrad och tilläten påkänning), A. F. Samsioe. Teknisk Tidskrift, vol. 54, no. 29, July 19, 1924, pp. 263-266 (Mekanik). Proposes use of "permissible stresses" instead of "safety factor" in mechanical constructions.

Photoelastic Analysis. See ELECTRIC MOTORS, Railway.

Riveted Tension Members. Net Section of Riveted Tension Members, T. R. Loudon. Can. Engr., vol. 47, no. 9, Aug. 26, 1924, pp. 269-271, 7 figs. Many specifications for calculating net sections are inadequate; investigations being conducted in photo-elastic laboratory of University of Toronto may develop new theory of stress distribution in riveted members.

Rotating Gear Pinions. See ELECTRIC MOTORS, Railway.

Shearing, on Flat Elastic Strips. On the Stability under Shearing Forces of a Flat Elastic Strip, R. V. Southwell and S. W. Skan. Royal Soc.—Proc., vol. 105, no. A 733, May 1, 1924, pp. 582-607, 6 figs. Investigation relating to a flat elastic strip, of uniform breadth, thickness, and material upon which a uniform shear is imposed by tangential tractions applied at its edges and in its plane.

Steel Structures. Investigation of Stresses in Corner Plates of Steel Structures (Bidrag till undersökning av påkänningar i knutplåtar för järnfackverk), T. Wyss. Teknisk Tidskrift, vol. 54, no. 12, Mar. 22, 1924, pp. 25-29 (Väg- och Vattenbyggnadskonst), 8 figs. Expansions under load in different points were measured by means of an instrument designed by Okhuizen in Haag; comparisons between calculated and measured stresses are tabulated, and formulas are derived for computation of maximum occurring stresses.

STRIKES

U. S. Coal Commission Report. Comments on the Work and Reports of the United States Coal Commission, E. W. Parker. Min. & Metallurgy, vol. 5, no. 209, May 1924, pp. 223-230. Points out that Commission report is equally unsatisfactory to operators and miners and recommendations are unjust.

STROBOSCOPES

Apparatus Embodying. Intermittent Illumination in Industry, With Special Reference to Its Use for the Examination of Moving Bodies, J. F. Crowley. Illuminating Engr., vol. 16, no. 8-9, Aug.-Sept. 1923, pp. 189-211, 31 figs. Discusses apparatus that have been evolved on principle of stroboscope and their application to industry, and physiological principles on which they are based.

Registration of Starting and Stopping Curves. The Registration of Starting and Inertia Curves with the Stroboscopic Disk (Die Aufnahme von Anfahr- oder Auslaufkurven mit der stroboskopischen Scheibe), K. Obermoser. Elektrotechnische Zeit., vol. 45, no. 18, May 1, 1924, pp. 428-430, 4 figs. Stroboscopic method of point registration of curves, which indicates speed of rotating masses when gradually starting or stopping.

Vibrant-Cord. A Stroboscope with Vibrant Cord for Study of Objects in Motion (Stroboscope à corde vibrante pour l'étude des pièces en mouvement), A. Bertrand. Revue Générale de l'Electricité, vol. 15, no. 19, May 10, 1924, pp. 848-850, 4 figs. Principle upon which design of stroboscope devised by A. Guillet is based; operation of apparatus and application to measurement of rotation speed of a motor.

STRUCTOLITE. See BUILDING MATERIALS, Structolite.

STRUCTURAL STEEL

Buckling Strength. Formula for Buckling Strength in Structural Steel (Eine Gebrauchsformel für Knickstäbe im Eisenhochbau), D. Mörike. Zentralblatt der Bauverwaltung, vol. 44, no. 31, July 30, 1924, pp. 260-263, 3 figs. Discusses Enler and Tetmajer formulas, safety factor, and gives examples of calculation.

Channels, Bending. See DIES, Bending.

Compression Members. Calculation of Compression Members, Formula for Buckling (Berechnung von Druckstäben, Gebrauchsformel für Knickung), Kommerell. Bauingenieur, vol. 5, no. 6, Mar. 31, 1924, pp. 150-153, 1 fig. Recommendations for changing line of permissible buckling stresses in German State Railway regulations.

Construction Code. Standard Practice in Steel Construction. Contract Rec., vol. 38, nos. 48, 49 and 50, Nov. 26, Dec. 3 and 10, 1924, pp. 1168-1170, 1194-1196 and 1210-1212. Code drawn up by Am. Inst. Steel Construction with a view to establishing uniform practice in fabrication and erection of structural steel and eliminating inconsistencies that have come into existence.

Erecting Cost Estimation. Estimating the Cost of Erecting Structural Steel and Iron Work, C. F. Dingman. Contract Rec. & Eng. Rev., vol. 38, no. 7, Feb. 13, 1924, pp. 155-157. Practical data that will enable contractor to bid intelligently on steel erection; cost of installing and glazing steel sash; method of listing items.

German Specification. L H L Structural Steel [L H L-Hochbaustahl (DIN 1000 St. < 58)], P. Pieper. Bautechnik, vol. 2, no. 43, Oct. 3, 1924, pp. 490-494, 11 figs. partly on supp. plates. New steel recently adopted by German Railway Minister for building and bridge construction, of 31 kg. per sq. mm. elastic limit, 48-58 kg. per. sq. mm. breaking strength, and minimum elongation of 20 per cent linear, made by Lauchhammer A. G. at Riesa. Details of construction of sections 8 and 9 at Leipzig fair with this steel.

High-Strength. Exhibition Hall of High-Strength Structural Steel, G. Hulsmeier. Eng. News-Rec., vol. 93, no. 26, Dec. 25, 1924, p. 1026, 3 figs. Saving of 10 per cent in weight of steel frame obtained by use of metal one-third stronger than soft steel. Abstracted and translated from Bauingenieur, Oct. 25, 1924.

Reinforced with Concrete. Steel Reinforced with Concrete, O. Faber. Concrete & Constr. Eng., vol. 19, no. 12, Dec. 1924, pp. 755-757, 1 fig. Results of tests on steel joists cased in concrete and tested in compression as stanchions, and tests on slabs composed of steel joists filled in with concrete.

Shearing Center. The Problem of Shearing Center (Zur Frage des Schubmittelpunktes), A. Eggenschwyler. Schweizerische Bauzeitung, vol. 83, no. 22, May 3, 1924, pp. 259-262, 10 figs. Critical discussion of articles by R. Maillart and A. Rohn in Mar. 8 and 22 issues of same journal; includes reply by R. Maillart.

St. 58. Nature and Significance of High-Grade Building Steel St. 58 (Einige Leitsätze über das Wesen und die Bedeutung des hochwertigen Baustahles St. 58), W. Gehler. Bauingenieur, vol. 5, no. 19, Oct. 1924, pp. 630-635, 2 figs. Discusses development of high-quality steels, including those for Manhattan Bridge and Hell Gate; German ingot steel of normal quality;

nickel versus carbon steels; properties of St. 58 steel, a refinement of normal steel.

Welding. See ELECTRIC WELDING, ARC, Structural Steel.

Yield-Point Data. Progress Report of the Special Committee on Stresses in Structural Steel. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 3, Mar. 1924, pp. 263-271, 6 figs. Data on yield point.

STRUCTURES

Circular, Calculation of. Calculation of Circular Structures (Om beregning av cirkelformede konstruksjoner), C. Raestad. Teknisk Ukeblad, vol. 71, nos. 2 and 3, Jan. 11 and 18, 1924, pp. 18-20 and 28-29, 4 figs. Theory of stresses occurring in circular or tubular structures when subjected to loads of different nature.

Effect of Wind on. Modern Ideas on Wind Force and Roof Truss Design, A. Tomlinson. Commonwealth Engr., vol. 11, no. 10, May 1, 1924, pp. 398-401, 1 fig. Discusses ordinary theory of wind pressure on roof, modern theory of wind pressure and result of investigations. Abstract of paper read before Instn. Engrs., Australia.

Framed, Vibration. See VIBRATIONS, Framed Structures.

Statically-Indeterminate. Automatic Calculation of Statically Indeterminate Structures (Automatische Berechnung statisch unbestimmter Tragwerke), O. Gottschalk. Bauingenieur, vol. 5, no. 9, May 15, 1924, pp. 263-272, 12 figs. Description of "continostat," by means of which large number of mechanical problems are solved. It consists of flexible steel straight edge, which is deflected by means of various pins, representing forces acting upon beam. Theoretical analysis and table of formulae.

Resistant Supporting Structure Over *n* Openings (Der biegungsfeste Stabzug über *n* Oeffnungen), J. Berlowitz. Zeit. für Angewandte Mathematik u. Mechanik, vol. 4, no. 3, June 1924, pp. 231-241, 13 figs. Develops elasticity equations for statically indeterminate frames with any load and of any form and compares them with Bleich and Ratzersdorf equations.

Use of Integrals and Determination of Displacement in Statically Indeterminate Supporting Structures (Zur Integralauswertung und Ermittelung von Verschiebungsgrössen bei statisch unbestimmten Tragwerken), L. David. Bauingenieur, vol. 5, no. 10, May 31, 1924, pp. 311-312, 3 figs. Discusses calculation of statically indeterminate supporting structures by means of equations of elasticity and rapid use of integrals.

Strength vs. Size. Mechanical Strength in Its Relation to Absolute Size, H. E. Eisenmenger. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 328-333. Shows why mechanical strength and other quantities are dependent on absolute size and not on relative size. Covers wide range of subjects in making point clear, including mechanical constructions, insects, Babylonians, the earth, Einstein's theory, Bronto-saurians, absolute unit system, etc.

STUCCO

Portland-Cement. Portland Cement Stucco, S. Warren. Am. Architect, vol. 126, nos. 2454, 2455, 2456, and 2457, Sept. 10, 24, Oct. 8, and 22, 1924, pp. 225-228, 269-272, 319-324, and 365-372, 32 figs. Discusses application of stucco to various surfaces and describes a proper method. Illustrates, from viewpoint of craftsman, manipulative methods employed to secure those various qualities of texture to which cement stucco readily lends itself. Presents exhaustively subject of color in stucco and explains how best and most lasting effects may be secured.

SUBMARINE CABLES. See CABLES, ELECTRIC, Submarine.

SUBMARINE SIGNALING

Sonic Depth Finder. The Sonic Depth Finder, H. C. Hayes. Am. Philosophical Soc.—Proc., vol. 63, no. 1, 1924, pp. 134-151. Details of sonic depth-finding, apparatus consisting of submarine sound transmitter, submarine sound receiver, and sonic depth finder, last serving to measure accurately time interval between sending of submarine sound signal and return of its echo from sea-bottom, etc.

Sound Transmitters. Present State of Acoustic Soundng Apparatus (Stato attuale del problema dello scandaglio acustico), M. Tenani. Rivista Marittima, vol. 57, no. 11, Nov. 1924, pp. 319-332, 30 figs. Historical data and present position of problem. Description of methods and instruments used. Velocity of sound in sea water. Bibliography.

Submarine Bells. Signaling by Means of Sound Below Water Surface (Das Signalisieren mit Schall unter Wasser), Hentschel. Glasers Annalen, vol. 95, no. 11, Dec. 1, 1924, pp. 267-275, 15 figs. Details of bells suspended from light ships or placed on bottom of ocean, driven by compressed air or electricity, and radio plants for aids in navigation; receiving apparatus on board.

Submarine Signalling, R. L. Williams. Tech. Eng. News, vol. 5, no. 1, Apr. 1924, pp. 10-11, 36 and 38, 2 figs. Describes submarine bell, and the oscilator, a more powerful sender invented by R. A. Fessenden; binaural system of determining direction of submarine sounds; multispot system of determining direction of submarine sounds; etc.

SUBMARINES

German Design. German Submarine Designs. Engineering, vol. 118, no. 3077, Dec. 19, 1924, pp. 837-838, 1 fig. Review of paper by Oswald Flamm published in Marine Rundschau under title of The Problem of Large Submarines.

Hulls, Strength of. Strength of Hollow Cylinders Reinforced Transversely and Subjected to Uniform External Pressure (Sul problema della robustezza di cilindri cavi rinforzati trasversalmente sottoposti da ogni parte a pressione uniforme esterna). Rivista Marittima, vol. 57, no. 1, Jan. 1924, pp. 49-69, 6 figs. Experiments with models of hulls of submarines; theory; practical examples.

Multiple Attack by. Multiple Attack by a Submarine (Lancio multiplo dai sommergibili), A. G. Chinaglia. Rivista Marittima, vol. 57, no. 3, March 1924, pp. 543-548. Mathematical discussion, dealing with speeds, inertia of submarines, etc.

SUBSTATIONS

Automatic. A 500-Kilowatt Automatic Substation. Engineer, vol. 138, no. 3595, Nov. 21, 1924, pp. 590-591, 3 figs. Substation exhibited at Brit. Empire Exhibition by Brit. Thompson-Houston Co., designed for d.c. output of 500 kw. at pressure of 550 volts.

Automatic Alternating-Current Substation, C. E. Schnell. Elec. World, vol. 83, no. 6, Feb. 9, 1924, pp. 279-281, 5 figs. Station used for lightly loaded but rapidly developing district; conditions to be met by automatic stations; details of installation and operation.

Automatic Substations, R. F. Wensley. Iron & Steel Engr., vol. 1, no. 1, Jan. 1924, pp. 1-4 and (discussion) 4-8, 9 figs. Discussion of automatic control devices used, and functions which they perform.

Automatic Sub-Stations at Manchester. Elec. Rev., vol. 95, nos. 2444 and 2445, Sept. 26 and Oct. 3, 1924, pp. 456-458 and 519-520, 6 figs. Details of layout of equipment; sequence of operation; starting for inspection; shutting down; hand control and protection.

Automatic Substations for Industrial Plants, C. Lichtenberg. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May, pp. 411-415, 7 figs. Principal types of electric-power transforming equipment to which automatic switching has been applied; automatic control of synchronous condensers, motor generators, converters, hydrolectric generators and feeders is treated in such manner as to furnish industrial engineers with data upon which to base designs of automatic stations for factories, mills, mines, shops and other kinds of industrial power supply.

New Features of St. Louis Automatics. Elec. Ry. Jl., vol. 63, no. 7, Feb. 16, 1924, pp. 249-252, 4 figs. Particulars of five substations installed by United Rys. of St. Louis; forced ventilation and duplicate power lines; units chosen for full-load operation with provision for exchanging equipment to obtain future increased capacity.

Progress in Noiseless Substation Design, L. J. Turley. Elec. Ry. Jl., vol. 63, no. 17, Apr. 26, 1924, pp. 645-651, 14 figs. Data on the five automatic substations placed in service by Los Angeles Ry. within last three years, and new one proposed; company has developed buildings to harmonize with surroundings in residential districts; use of automatics has produced satisfactory operating results and substantial economies; methods of eliminating noise.

The Application of Automatic Control to Mine Substations, C. E. H. von Sothen. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 8, Aug. 1924, pp. 729-735, 8 figs. Brief outline of method of operation and protection provided for both synchronous converter and synchronous motor-generator equipments.

The Peebles-Reyrolle Automatic Substation. Engineering, vol. 138, no. 3062, Sept. 5, 1924, pp. 323-327, 7 figs. Describes completely automatic substation capable of performing all functions which usually demand intervention of a skilled operator, produced as result of collaboration of two firms of A. Rayrolle & Co., Ltd., and Bruce, Peebles, & Co., Ltd. Reyrolle's metal-clad switchgear has been applied in connection with standard motor-converting machinery of Bruce, Peebles, & Co.

See also Railway.

Central-Station Service, Application to. Application of Automatic Substations to Central Station Service in Metropolitan Districts, C. W. Place. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 634-641, 16 figs. Present trend to interconnection and installation of large-capacity stations, with changing character of city load, make relief of operating crew of a system of greatest importance. This can best be done by use of automatically-controlled substations in the various types of service. Equipment for each class of service is in successful operation showing great dependability and any particular problem of operating companies can be attacked, keeping in mind certain fundamentals of design, construction and application.

Coal-Mine. Motor-Generator Sets in Two Substations Operated In Parallel and Controlled from Surface, R. B. Wagner. Coal Age, vol. 25, no. 17, Apr. 24, 1924, pp. 593-598, 8 figs. At Dorrance Colliery of Lehigh Valley Coal Co., Wilkes-Barre, Pa., substations have been equipped with semi-automatic substation equipment to supply d.c. energy for typical mine load, but in unusual way; greater part of control equipment is placed in separate building on surface.

The Application of Automatic Control to Mine Substations, C. E. H. Von Sothen. Coal Industry, vol. 7, no. 4, Apr. 1924, pp. 143-149, 3 figs. Methods of meeting substation problem at mines; outline of method of operation and conclusions as to advantages of automatic equipment.

Combined Railway and Power. Railway and Power Substations Combined for Economical Operation. Elec. Ry. Jl., vol. 63, no. 19, May 10, 1924, pp. 729-731, 4 figs. Cicero (Ill.) substation of Chicago Rapid Transit Co. and Pub. Service Co. of Northern Illinois presents example of coördinated efforts to reduce maintenance and operating costs. Details of installations.

Design. Substation Design to Meet Space Limits, J. C. Gaylord. Elec. World, vol. 84, no. 19, Nov. 8, 1924, pp. 989-992, 5 figs. Unusual conditions on Southern Cal. Edison system lead to innovations in plans; transformer cooling coils are placed on roof of building; special arrangement of equipment necessary.

The Design of Static Sub-Stations, With Some Notes on Their Equipment, N. Thornton. Jr. Instn. Engrs., vol. 35, part. 2, Nov. 1924, pp. 37-72, 25 figs. Considers requirements and objects of a substation, reviews the different forms of equipment to be accommodated, their effect on substation design, and considers actual substation design by means of several typical examples.

Elevated-Railway. Supervisory Controlled Substation on Chicago Elevated, D. L. Smith. Elec. Ry. Jl., vol. 64, no. 19, Nov. 8, 1924, pp. 795-798, 6 figs. Describes new substation of Chicago Rapid Transit Co. at Central Street, Evanston, at junction with North Shore & Milwaukee R. R.; 2000-kw. machine has full automatic features; building located in residential section, necessitating artistic design.

High-Voltage. The Charleroi Substation of the West Penn Power Company, Geo. S. Humphrey. Elec. Jl., vol. 21, no. 11, Nov. 1924, pp. 498-504, 17 figs. Discusses high-voltage substations, transmission problems, and manner in which these problems were solved; describes main features of Charleroi substation.

Large-Capacity for City Distribution. Substations for Present-Day Requirements, L. C. Williams. Elec. Wld., vol. 84, no. 23, Dec. 6, 1924, pp. 1195-1199, 11 figs. Unit system employed in large-capacity substation for city distribution; latest practice as embodied by city of Los Angeles; describes typical substation.

Machinery, Ventilation and Noise Control. Ventilation and Noise Control of Sub-Station Machinery, F. T. Hague. Elec. Jl., vol. 21, no. 3, Mar. 1924, pp. 106-111, 5 figs. Enclosure of synchronous converters and motor-generator sets; methods of reducing noise.

Mercury-Vapor-Rectifier. The Mercury Arc Rectifier Substations of the Midi Railway, W. Walty. Brown Boveri Rev., vol. 11, no. 9, Sept. 1924, pp. 191-205, 23 figs. Describes equipment of substations, diagram of connections, transformers, absorption choke coils, vacuum pump, protecting screen, cooling system, layout of plants, acceptance tests and results with rectifiers in service.

Motor-Generator. Automatic Motor-Generator Station (Eine selbsttätige Umformeranlage), P. v.d. Sterr. Elektrotechnische Zeit., vol. 45, no. 16, Apr. 17, 1924, pp. 361-364, 6 figs. Describes fully automatic substation containing several large motor-generator sets which has been in successful operation for last 13 years; sets are started from direct-current side, are brought up to proper speed and voltage and are synchronized to buses; motors are 240-volt direct current, generators giving 3000-volt single-phase current.

Outdoor. New Types of Outdoor Substations. C. D. Gray and M. M. Samuels. Elec. Wld., vol.

84, nos. 5 and 6, Aug. 2 and 9, 1924, pp. 208-210, and 263-267, 10 figs. Structural details; use of motor-operated disconnecting switches; description of new type of "disconnect"; lighting and control features; specific installation details for modern step-in and step-down outdoor substations; securing safety and economy without decreasing reliability.

Outdoor Traction Sub-stations. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 561-563, 7 figs. partly on p. 556. Describes substation at Olten, Switzerland, supplying current for lines of Swiss Fed. Rys.; details of equipment.

See also Railway.

Portable. Portable Substation with Telescopic Tower. Elec. Ry. Jl., vol. 64, no. 9, Aug. 30, 1924, pp. 309-310, 4 figs. Suitable spacing for 33,000-volt outdoor apparatus and overhead clearance when station is moving over right-of-way are obtained by telescoping arrangement employed on interstate 300-kw. portable.

Railway. Automatic Sub-Station for the Hendon-Edgware Extension Railway. Engineering, vol. 118, no. 3059, Aug. 15, 1924, pp. 227-228, 4 figs. partly on p. 230. Describes substation which supplies electric power for operating trains on extension of Lond. Elec. Ry.; largest automatic substation in Great Britain, and also first to be installed for electric traction purposes; building designed to accommodate three 1200-kw. rotary converters with their control gear and accessories. Describes also method of operation.

Automatic Substations for Supplying 1500 Volts Direct Current to Suburban Railways, C. A. Butcher. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 622-626, 3 figs. Important points which should be given careful consideration by those contemplating electrification.

New Automatic Substation for Vancouver. Elec. Traction, vol. 20, no. 3, Mar. 1924, pp. 145-146, 2 figs. Description of Bodwell substation of British Columbia Elec. Ry. Co., installed to improve trolley voltage conditions and to mitigate electrolysis condition.

The Olten Outdoor Substation of the Swiss Federal Railways (Das Freiluft-Unterwerk Olten der Schweizer Bundesbahnen), E. Heusser. Elektrotechnik u. Maschinenbau, vol. 42, no. 44, Nov. 2, 1924, pp. 637-640, 5 figs. Describes general switching arrangement; single-phase current, 15 kv. at 16 2/3 per. per sec., transformed to 60 kv.

Rectifiers for. See RECTIFIERS, Mercury-Vapor.

Remote-Control. Remote Control for Sub-Stations, C. J. Sargeant and T. N. Riley. Electrician, vol. 93, no. 2407, July 4, 1924, pp. 12-13, 4 figs. Details of use of supervisory telephone systems for control of substations from central stations.

Supervisory Systems for Control and Indication of Remote Power Equipment, C. E. Stewart and J. C. Field. Gen. Elec. Rev., vol. 27, no. 2, Feb. 1924, pp. 121-129, 12 figs. "Supervisory system" as applied to power distribution field is defined as one which gives a load dispatcher direct control over rotating or switching equipment of a power network and a continuous visual indication of operating position of such equipment. Describes distributor, selector, and cable systems.

Saxony. See ELECTRIC TRANSMISSION LINES, 100-Kv. System.

Semi-Automatic. Semi-Automatic Substation at Concord. Elec. Ry. Jl., vol. 63, no. 9, Mar. 1, 1924, pp. 321-323, 7 figs. Describes installation of Concord Elec. Rys., Concord, N. H., an improvement over earlier one of smaller capacity destroyed by fire; has rating of 500 kw.; needs only to be started in morning.

60,000-Kva. Features of 60,000-Kva. Substation, J. E. Goodale. Elec. World, vol. 84, no. 17, Oct. 25, 1924, pp. 881-884, 5 figs. Underground feeders at 13,200 volts and 26,400 volts supply Metropolitan substation of N. Y. & Queens Elec. Light & Power Co. at Maspeth; multiple-voltage transformer banks used; details of switch and bus structures.

South Africa. The Automatic Sub-Station in South Africa. S. African Power Engr., vol. 9, nos. 78 and 79, Oct. and Nov. 1924, pp. 13-15, 17, 19 and 21, and 20-21, 4 figs. Account of first automatic substations erected in South Africa by Durban Municipality, explaining also their working.

Standardization. Standardizing Small Substations, J. C. Gaylord. Elec. Wld., vol. 84, no. 8, Aug. 23, 1924, pp. 357-359, 7 figs. Describes three types standard stations developed by South. Cal. Edison Co. for 2200-volt or 4000-volt distribution with capacity up to 6000 kva.

12,000-Kw. The Cleveland Heights Substation of the Cleveland Electric Illuminating Company, H. L. Wallau. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 555-556, 6 figs. A.c. station having ultimate capacity of 12,000 kw..

SUBWAYS

Berlin, Germany. Construction of the New North and South Subway in Berlin, Germany, M. A. R. Brunner. Elec. Traction, vol. 20, no. 1, Jan. 1924, pp. 15-16, 4 figs. Technical difficulties.

Calcutta, India. Tube Railways for Calcutta, Dalrymple Hay. Elec. Ry. & Tramway Jl., vol. 50, no. 1219, Jan. 11, 1924, pp. 23-25. A comprehensive scheme. Surface stations, including booking halls, stairs, escalator machinery chambers, etc.; preliminary estimate of cost of construction; future railways; general observations and recommendations.

Camden, N. J. Jackson Street Subway, Camden Terminal. Ry. Rev., vol. 75, no. 8, Aug. 23, 1924, pp. 279-281, 5 figs. Describes structure, part of large project, which was built with simple but effective and efficient construction methods.

Cars. New Cars of the North-South Railway in Berlin (Neue Wagen der Berliner Nordsüdbahn), Kemmann. Verkehrstechnik, vol. 41, no. 13, Mar. 28, 1924, pp. 115-118, 5 figs. Have three doors on each side and longitudinal seats between doors, leaving very liberal standing space; motors have automatic ventilation and are equipped with precision roller bearings.

Construction. Constructing A Difficult Subway With Consummate Skil, A. S. Taylor. Compressed Air Mag., vol. 29, no. 6, June 1924, pp. 897-902, 23 figs. Work in connection with construction of Queensboro Subway extension in New York City.

Construction Methods on the Rochester Subway. Eng. News-Rec., vol. 92, no. 9, Feb. 28, 1924, pp. 350-354, 11 figs. In converting old Erie Canal bed for passenger subway, line drilling was economic substitute for channeling; dry-batch haulage to mixing and chuting plant on car; excavation methods; concrete subway construction.

London, England. London's North to South Tube Railway. Tramway & Ry. Wld., vol. 56, no. 30, Dec. 18, 1924, pp. 313-320, 17 figs. Particulars of extensions made by City Railway; details of enlargement of tunnels, improved stations, permanent way and signaling, and rolling stock.

The Camden Town Extension, London Electric Railways. Engineer, vol. 137, no. 3559, Mar. 14, 1924, pp. 288-289, 6 figs. Length of underground extension is 1.8 mi. and its construction was made

unusually difficult by presence of two connecting tube tunnels for Highgate line at Camden Town.

Los Angeles, Cal. Los Angeles Builds a Subway. Elec. Traction, vol. 20, no. 8, Aug. 1924, pp. 343-345, 4 figs. Pacific Elec. Ry. Co. will have extensive underground transportation facilities with completion of new tunnel.

Madrid, Spain. Construction of the Alfonso XIII Metropolitan (Las obras del Metropolitano Alfonso XIII), M. Otamendi. Revista de Obras Públicas, vol. 72, no. 12, June 15, 1924, pp. 221-225, 7 figs. Details of East-West line between stations of Ventas and Sol recently opened for traffic; details of layout and construction work, including tunneling, station facilities, etc.

New York City. See RAPID TRANSIT, Suburban, New York City.

Repair-Shop Methods. Keeping Subway Trains on Schedule, F. H. Colvin. Am. Mach., vol. 66, nos. 14 and 16, Apr. 3 and 17, 1924; pp. 491-493 and 587-589, 16 figs. Methods of handling motive power in exacting service. Apr. 3: Wheels, tires and journal bearings. Apr. 17: How motor pinions are removed and armatures taken out of motors; method of testing pinions for cracks.

Train-Movement Noise, Reduction of. Reducing Noise in Train Operation. Elec. Ry. Jl., vol. 63, no. 4, Jan. 26, 1924, pp. 135-138. Results of extended series of tests made by Underground Elec. Rys. of Lond. Methods developed for preventing noise from entering cars; sound-absorbing material placed in roof, walls and floor; heavy closed windows, special ventilators and shrouding of trucks are principal features incorporated in new cars.

SUGAR

Beet Molasses Desugarizing. Barium Process Shows Interesting Possibilities for Desugarizing Beet Molasses, H. W. Dahlberg. Chem. & Met. Eng., vol. 31, no. 3, July 21, 1924, pp. 100-103, 3 figs. Describes process for recovery of sugar, based on reaction between barium hydrate or oxide and sugar, whereby an insoluble monosaccharate is formed. This extremely efficient method, commercial development of which has been retarded by high cost of barium hydrate, is able to operate successfully under Italian conditions.

Beet-Sugar Industry, Japan. Beet Sugar Industry in Japan, H. C. Huggins. La. Planter & Sugar Mfr., vol. 72, no. 1, Jan. 5, 1924, pp. 7-8. Cultivation of sugar beets; factories; method of refining.

Beet-Sugar Manufacture. A Problem in Beet Sugar Production—Improvements in Hot Saccharate Process, R. W. Shafor. Chem. & Met. Eng., vol. 31, no. 3, July 21, 1924, pp. 107-110, 6 figs. Chemical engineering involved in recovering last 10 per cent of sugar as carried out in four plants.

What the Beet-Sugar Industry Has Learned About Filtration, J. Maudru. Chem. & Met. Eng., vol. 31, no. 3, July 21, 1924, pp. 111-115, 6 figs. Operating practice and trend of recent developments in modern plant reveal progressive attitude toward industry's outstanding chemical engineering problem.

Cane Factory, Steam Consumption in. The Steam Consumption of Cane Sugar Factories, P. H. Parr. Int. Sugar Jl., vol. 26, no. 301, Jan. 1924, pp. 12-18. Suggestions with reference to estimation of probable steam consumption in given case; results of calculation on lines indicated are said to be usually quite close to actual requirements in practice.

Cane-Juice Clarification. The Petree Process for the Clarification of Cane Juices, E. E. Hartmann. Indus. & Eng. Chem., vol. 16, no. 11, Nov. 1924, pp. 1178-1180, 3 figs. Process is new development in clarification of sugar-cane juices resulting in reduction of sugar losses during manufacture; compact equipment used in process reduces operating costs and minimizes space requirements.

Cane-Planting Machine. A New Cane Planting Machine. West. Machy. Wld., vol. 15, no. 10, Oct. 1924, pp. 348 and 352, 3 figs. Describes a machine which has been devised on Lihue Plantation of Island of Kauai, Hawaii, where it is in successful operation. An average of 6 acres a day is being made by it.

Cane-Sugar Machines. American Machinery for the Manufacture of Cane Sugar, C. A. Handschin. West. Machy. Wld., vol. 15, nos. 6, 7, and 8, June, July, and Aug. 1924, pp. 183-186, 211-215, and 265-267, 33 figs. June: Field equipment used by Hawaiian planters for cultivating and harvesting sugar cane. July: Modern methods used for unloading cane as it arrives at factory, and modern machinery built by Honolulu Iron Works for extraction of juice. Aug.: Brief description of boiler-house equipment for evaporation of juice to syrup and for separation of crystals.

Machines for Producing Cane Sugar, F. Mertz. Eng. Progress, vol. 5, no. 2, Feb. 1924, pp. 23-25, 6 figs. Description of crushing mill made at Krupp's Gruson Works; utilization of crushed cane; heat economy.

Cane-Sugar Manufacture. Cane Sugar in Cuba, A. M. Young. Chem. & Met. Eng., vol. 30, nos. 22 and 23, June 2 and 9, 1924, pp. 857-861 and 902-906, 20 figs. Conditions under which cane is cultivated and chemical engineering of raw-sugar production. June 2: Process through defecation of juice. June 9: New equipment for clarifying juice: Dorr clarifier; Petree process; concentration of juice; sugar boiling; separation of crystals; packing sugar; chemical control; definition of terms used in control work.

Carbonatation Process. The Case for the Carbonatation Process in the Manufacture of White Sugars, F. Maxwell. Int. Sugar Jl., vol. 26, no. 301, Jan. 1924, pp. 22-26. With particular reference to South Africa. Deals with capital expenditure entailed in acquiring and erecting necessary installation.

Chilean Industry. Beet Sugar Industry (Industria del azúcar de betarraga), F. Busse. Sociedad de Fomento Fabril—Boletín, vol. 41, no. 6, June 1924, pp. 395-399. Details as to economic production of sugar, and beet-sugar factory equipment and costs.

Colloids in Manufacture of. See COLLOIDS, Sugar Manufacture.

Darco as Refining Charcoal. Darco, a Boneblack, Is a New Product of Lignite, H. C. Marshall. Coal Age, vol. 26, no. 10, Sept. 4, 1924, p. 334. Darco Corporation of Wilmington, Del., a subsidiary of Atlas Powder Co., with a plant and mines at Marshall, Tex., to manufacture Darco, a decolorizing and deodorizing carbon which they claim will take place of boneblack in refining of sugar.

Evaporators. Principles of Evaporation and Sugar Mill Evaporators, J. O. Frazier. Nat. Engr., vol. 28, no. 6, June 1924, pp. 273-276, 3 figs. Film evaporators, their operating principles and construction details. Kestner film evaporator. Vital factors in evaporation.

See also EVAPORATORS, Sugar-factory.

Factory Equipment Standardization. Standardization of Sugar Factory Equipment, G. H. W. Barnhart. La. Planter & Sugar Mfr., vol. 72, no. 14, Apr. 5, 1924, pp. 294-295. Requirements

of different equipment as indicated on three different occasions. Presents standards for certain cane sugar factory equipment which can be adopted and used in comparing equipment of factories handling cane juices of very different characteristics.

Manufacture, Corrosion Problems in. Corrosion Dragon in the Sugar Industry. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 58-60, 6 figs. Corrosion problems encountered in refining of cane sugar and in production of beet sugar, and some of the construction materials used in combating them.

Milling and Clarifying Equipment. Report on Milling and Clarifying Equipment in Hawaii. Int. Sugar Jl., vol. 26, no. 302, Feb. 1924, pp. 88-91, 4 figs. Searby shredders; unstrained juice pulp; maceration distributor; strainers.

Mills, Furnace Heat Losses. A Study of Heat Losses in Sugar Mill Furnace Gases, J. O. Frazier. Nat. Engr., vol. 28, no. 2, Feb. 1924, pp. 64-66. Suggestion on how to recover heat lost from moisture in fuel; analysis of heat losses in modern boiler furnace operation and suggestions for most effective means of recovering waste heat; records of economizer performance in a large boiler plant.

Petree Process. Report on the Petree Process at Puunene and Paia, T. H., S. S. Peck. Int. Sugar Jl., vol. 26, no. 303, Mar. 1924, pp. 133-138. Effect on mill rollers and on extraction; question of fuel economy; recovery comparisons; etc. Includes letter by E. E. Hartmann dealing with effect on sucrose value, and factors responsible for improved recovery.

Refining and Manufacture. Process of Sugar Refining and Manufacturing. La. Planter & Sugar Mfr., vol. 72, no. 1, Jan. 5, 1924, pp. 10-13. Patented invention by Roy D. Elliott, relating to improved process of sugar manufacture and refining, and recovery of by-products.

Waste Disposal, Beet-Sugar. Disposal of Waste from the Beet Sugar Industry, E. Bartow. Chem. Age (N. Y.), vol. 32, no. 9, Sept. 1924, pp. 373-375. Classification of beet-sugar wastes; German patents on molasses utilization and associated subjects; disposal of the Steffen's waste.

SULPHUR

Industrial Uses. New Uses for Sulfur in Industry, W. H. Kobbé. Indus. & Eng. Chem., vol. 16, no. 10, Oct. 1924, pp. 1026-1028. Deals with materials which have been impregnated with molten sulphur by simple immersion in bath of this substance, such as diatomaceous earth, concrete, building brick, bifrous materials, various asbestos products, sandstone, fiber board, etc.

Production and Use. Production and Use of Refined Sulphur, C. A. Newhall. Chem. & Met. Eng., vol. 31, no. 4, July 28, 1924, pp. 144-149, 10 figs. Discussion of technology of manufacturing refined sulphur and of advantages and methods of commercial utilization. From paper read before Am. Inst. Chem. Engrs., July 1924.

Sulphur, Nev. A Novel Sulphur Enterprise in Nevada, A. J. Crowley. Eng. & Min. Jl.-Press, vol. 118, no. 20, Nov. 15, 1924, pp. 774-776, 4 figs. Notes on sulphur deposits at Sulphur, Nev., owned and operated by Humboldt Sulphur Co., mining, and metallurgical practice. Ore mined from surface and underground; ingenious process for steaming out sulphur.

Technology and Uses. Technology and Commercial Applications of Sulphur, H. H. Wilkinson. Chem. Age (N. Y.), vol. 32, nos. 1, 2, and 3, Jan., Feb., and Mar., 1924, pp. 22-24, 60-62, and 140-145. Résumé of diversified uses of sulphur, free and uncombined, in various arts.

Thermal Properties. See REFRIGERANTS, Sulphur Dioxide.

SULPHURIC ACID

Chamber Process. Are Lead Chamber Processes Reversible? (Sur la réversibilité des réactions de formation de l'acide sulfurique dans le procédé des chambres de plomb), A. Graire. Académie des Sciences—Comptes Rendus, vol. 179, no. 7, Aug. 18, 1924, pp. 397-400; also (translation) in Chem. & Met. Eng., vol. 31, no. 23, Dec. 8, 1924, pp. 892-893. Indicates that chamber-process reactions are reversible reactions.

Contact Process. Equipment Developments in the Contact Sulphuric Acid Process, F. C. Zeisberg. Chem. & Met. Eng., vol. 30, no. 21, May 26, 1924, pp. 829-831, 2 figs. Describes and evaluates marked changes that have taken place during 25 years of life of process.

Present Status of the Contact Sulphuric Acid Industry In Russia, J. R. Minevitch and W. M. Malisoff. Chem. & Met. Eng., vol. 30, no. 10, Mar. 10, 1924, pp. 384-388, 2 figs. Historical account of development reveals interesting application of modern processes and equipment in growing heavy chemical industry.

Fuming, Vapor Pressures of. The Vapour Pressures of Fuming Sulphuric Acid, and Their Application to the Problem of the Absorption of Sulphur Trioxide, J. W. McDavid. Chem. & Industry, vol. 43, no. 12, Mar. 21, 1924, pp. 57T-61T, 1 fig. Describes method of calculation employed to determine conditions governing production of oleum, shows how conditions may be varied to meet any particular case, and indicates how closely actual practice approximates to theory.

Manufacture. Industrial Production of Sulphuric Acid (La préparation industrielle de l'acide sulfurique), M. Bouleau. Vie Technique & Industrielle, vol. 5, nos. 59 and 61, Aug. and Oct. 1924, pp. 293-296 and 445-448, 8 figs. Details of lead chamber process and apparatus used. Cost data.

Sulphuric-Acid Manufacture According to the Gaillard System (La fabrication de l'acide sulfurique par le procédé E. A. Gaillard), P. Le Breton. Chimie & Industrie, vol. 11, no. 4, Apr. 1924, pp. 662-664, 5 figs. See also (translation) in Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1934, June 13, 1924, p. 711. Intensive system of manufacture as practiced in plant in Spain; efficiency figures obtained in practice; use of empty Glover and Gay-Lussac towers; mechanical devices.

Sulphuric Acid Plants—Old and New, P. Parrish. Chem. Age (Lond.), vol. 10, no. 250, Mar. 29, 1924, pp. 316-318, 4 figs. Developments in manufacture of sulphuric acid. Summary of lecture delivered before Jr. Instn. Engrs.

SULPHUROUS ACID

Distillation. Distillation of Sulphurous Acid Dissolved in Water (Destillation av svavelsyrlighet i vattenlösning), E. Oeman. Teknisk Tidskrift, vol. 54, no. 45, Nov. 8, 1924, pp. 81-85 (Kemi), 10 figs. Experimental determination of quantities of sulphurous acid dissolved in water at different temperatures and pressures. Results of practical distillation of same from solutions in water.

SUPERHEATED STEAM

Advantages. Convenient Analysis of Modern Plant and Application to Ship Propulsion. Power, vol. 60, no. 1, July 1, 1924, pp. 18-20, 7 figs. Net plant efficiencies with stage bleeding or reheating which may be quickly obtained from simple diagrams with appropriate corrections.

Closed Heaters, Direct Use in. Superheated Steam Used Directly in Closed Heaters, B. C. Sprague. Power, vol. 59, no. 5, Jan. 29, 1924, pp. 160-161, 1 fig. Author has conducted tests under various conditions, indicating that heat

transfer is same with both saturated and superheated steam of same pressure, while temperature of tube is below that of saturation; explains that heat transfers per sq. ft. per hr. should be equal.

Heat Content, Measurement of. Direct Measurement of the Heat Content of Superheated Steam, N. S. Osborne. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 808-809. Calorimetric method of surveying behavior of superheated steam by employing isothermal throttling in saturated-steam calorimeter.

Insulation. Superheated Steam Insulation Pays, R. H. Heilman. Chem. & Met. Eng., vol. 31, no. 24, Dec. 15, 1924, pp. 934-936. Shows relatively short time required to repay original cost of installations and relatively large return per year on investment that can be effected by proper insulation of superheated steam surfaces. (Abstract.) Paper read before Am. Inst. Chem. Engrs.

Regenerative Feed Heating by. Regenerated Feed Heating by Superheated Steam, Thos. B. Morley. Engineer, vol. 138, no. 3594, Nov. 14, 1924, pp. 544-545, 2 figs. Author seeks to demonstrate fallacy of statement that use of superheated steam extracted from higher pressure stages of turbine for feed heating is essentially uneconomical on purely thermodynamic grounds; discusses process of regenerative feed heating in general with reference to steam-turbine plant.

Research. Harvard Throttling Experiments Extend Data on Superheated Steam, P. W. Swain. Power, vol. 60, no. 9, Aug. 26, 1924, pp. 329-332, 4 figs. Work being done by Prof. Davis and Dr. Kleinschmidt at Harvard, where extremely accurate measurements are being made of Joule-Thomson effect.

SUPERHEATERS

Detachable-Tube. A New Detachable Tube Superheater. Engineer, vol. 137, no. 3572, June 13, 1924, pp. 667-668, 4 figs. Improved form evolved by Thos. Sugden.

Developments. Superheaters and their Latest Developments, B. N. Broido. Combustion, vol. 11, no. 1, July 1924, pp. 42-45, 4 figs. Developments in design of superheaters to meet demands of modern power plants.

Heat Exchange in. Heat Exchange in Steam Superheaters (Ueber den Wärmeaustausch in Dampfüberhitzern), C. Rühl. Wärme- u. Kälte-Technik, vol. 26, no. 14, July 22, 1924, pp. 115-118, 11 figs. Discusses heat transmission and describes patented pipe with interior partition having heat transmission of 1.2 times that of ordinary pipes.

Locomotive. Criticism of Locomotive Superheaters (Zur Kritik des Lokomotivüberhitzers), R. P. Wagner. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, pp. 951-956, 29 figs. Requirements of steam superheaters, types used in Germany, possibilities of developments, bases for calculations.

Locomotive Superheaters. Ry. Gaz., vol. 41, no. 7, Aug. 15, 1924, p. 224, 2 figs. Describes return bend evolved by Northeastern Mar. Eng. Co., Ltd., to meet most exacting conditions of service.

Locomotive Superheaters. Superheater Co. (Locomotive Superheaters)—Bul. 11. Description, operation and maintenance of Elesco type "A" locomotive superheater.

Locomotive Superheaters, R. T. Wagner. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 905-906, 6 figs. Examines 12 types of superheaters used or tried on German railways. (Abstract.) Translated from Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 37, Sept. 13, 1924, p. 951.

The Manufacture of Locomotive Superheaters. Ry. Engr., vol. 45, no. 539, Dec. 1924, pp. 420-422, 9 figs. Methods and equipment of superheater shops at Wallsend Works of North Eastern Mar. Eng. Co.

Operation and Types. See BOILERS, Operation and Types.

Radiant-Heat. Operation of Radiant Heat Superheaters. Power Plant Eng., vol. 28, no. 10, May 15, 1924, pp. 528-529, 1 fig. Steam temperature varies slightly with percentage of CO_2; advantages of two-stage superheating.

River Boats. Superheated Steam for River Boats. Superheater Co. (Marine Superheaters)—Bul. M-7. Points out special advantages of Elesco superheaters for Mississippi River-type boilers; description of superheaters; lubrication and operation; results of tests on river boats equipped with superheaters.

Sectional. A New Sectional Superheater. Power Engr., vol. 19, no. 214, Jan. 1924, p. 24, 2 figs. Describes sectional modification of Adamson-Cruse accumulator-superheater.

SUPERPOWER

Fuel Economy Through. Fuel Economy Through Interconnection, N. G. Reinicker. Engrs. & Eng., vol. 41, no. 4, Apr. 1924, pp. 97-99. Paper read at conference on Economy in the Use of Fuel, held at Engrs. Club of Phila., Jan. 15, 1924.

Interconnected System, Pacific Coast. Physical Aspects of the Pacific Coast Interconnected System. Jl. Electricity, vol. 52, no. 3, Feb. 1, 1924, pp. 100-101, 1 fig. Survey shows that two small gaps, one in Oregon and other in Washington, remain before complete tie-in of lines serving California, Oregon, Washington and Montana can be effected; with these closed, system that has no parallel in any part of world would then exist.

Interconnection and. Superpower and Interconnection, Herbert Hoover. Elec. World, vol. 83, no. 21, May 24, 1924, pp. 1078-1080. Points out that economical expansion is possible in these twin developments and shows necessity of keeping initiative free from deadening influence both of bureaucracy and of socialistic experiment. (Abstract.) Address before Nat. Elec. Light Assn.

Interconnection, Southeastern States. Interchange of Power in the Southeastern States, J. M. Oliver. Iron & Steel Engr., vol. 1, no. 11, Nov. 1924, pp. 573-575, 5 figs. Virtual super-power system has been in existence in South for several years covering Alabama, Georgia, Tennessee, North and South Carolina; consists of interconnected systems of seven independent companies.

Interconnection of Power Systems in the Southeastern States, W. E. Mitchell. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1150-1153. Problems of interconnection, power interchange and operation of interconnected systems. (Abridgment.)

The Interconnected Power Systems of the Southeast, Chas. G. Adsit. Am. Soc. Civ. Engrs.—Proc., vol. 50, no. 8, Oct. 1924, pp. 1286-1302, 2 figs. Describes system of Georgia Railway and Power Company, which is said to be typical of other companies connected with interconnected transmission systems of Southeast.

Isolated Station vs. Superpower vs. Coal Conservation, E. Douglas. Power, vol. 59, no. 12, Mar. 18, 1924, pp. 448-449. Points out that panacea of all troubles does not lie with superpower, nor will isolated plant be best solution in all cases, but a combination of the two with proper consideration given to both power and heating, as well as use of steam for industrial purposes, will be intelligent solution. (Abstract.) Paper read before Wis. Eng. Soc.

Northeastern United States, Survey of. Northeast Power in 1930. Elec. Wld., vol. 84, no. 5, Aug. 2, 1924, pp. 205-207, 4 figs. Estimated power demand in 1930; committee advocates large steam stations and development of water power.

Northeast Superpower Studies Completed. Power, vol. 60, no. 5, July 29, 1924, pp. 179-182, 6 figs. Also Eng. Wld., vol. 25, no. 2, Aug. 1924, pp. 77-79, 1 fig. Abstract of report covering present and future power requirements of the ten Northeastern states and part of Ohio, Virginia, and West Virginia, with special reference to cost of delivering hydroelectric power. Report indicates growth in use of electrical power for industrial and other purposes; recommends extension of interconnection between different systems, construction of large steam plants strategically located, and development of large hydroelectric projects. See also Engineers' Committee Report on Northeastern Super-Power, Eng. News-Rec., vol. 93, no. 5, July 31, 1924, pp. 186-188, 3 figs., giving comparative costs of power through combination of different sources.

Regulation. Superpower and Its Public Relations, H. W. Hoover. Military Engr., vol. 16, no. 88, July-Aug. 1924, pp. 278-282, 11 figs. partly on supp. plates. Discusses increase and development of power systems, and its three cardinal factors, viz., service, conservation, and low cost; coördinate regulation by states with coöperation of federal government.

Significance of. The Significance and Status of Super Power Development in the United States, E. B. Whitman. Mfrs. Rec., vol. 85, no. 13, Mar. 27, 1924, pp. 79-81, 1 fig. Résumé of what it is hoped will be eventually accomplished for the entire country.

Stations. See CENTRAL STATIONS, Superpower.

SURVEYING

Aerial. Aeroplane Surveying, H. L. Cooke. Eng. Jl., vol. 7, no. 9, Sept. 1924, pp. 599-602. Progress in preparation of contoured maps from air photographs.

Present State of Aerial Photography for Topographic Surveying (Lo stato attuale dei metodi di rilevamento topografico dagli aerei), G. Cassinis. Ingegneria, vol. 3, no. 9, Sept. 1, 1924, pp. 306-317, 22 figs. Details of various types of cameras, theodolites, etc., including those of Zeiss, Nistri and Heyde.

The Use of the Aeroplane in Surveying and Engineering, E. Wilson. Eng. Jl., vol. 7, no. 1, Jan. 1924, pp. 3-7, 4 figs. Its application to engineering works, with special reference to forest surveys and right-of-way reconnaissance surveys.

Transmission Line Work Aided by Aerial Survey, F. A. Allner and J. R. Baker. Eng. News-Rec., vol. 92, no. 9, Feb. 28, 1924, pp. 360-363, 1 fig. Advantages and limitations of air mapping accurately evaluated in two high-tension lines in Pennsylvania; aerial survey cost less than $50 per mi.

Aerial Photographic. See AERIAL PHOTOGRAPHY, Surveys; MAPPING, Aerial Photography in.

Geodetic. A Simple Form for the Azimuth Equation, L. B. Stewart. Can. Engr., vol. 46, no. 18, Apr. 29, 1924, pp. 475-477, 1 fig. By "azimuth equation" is meant equation used in reducing an observation of Polaris to determine azimuth of a direction, observation being taken at any time. Operation of finding pole star in daylight; taking observation; formulas for reducing, suitable for most precise geodetic observations, or those taken with engineer's transit.

The Function of Geodesy in Surveying, W. Bowie. Military Engr., vol. 16, no. 86, Mar.-Apr. 1924, pp. 140-143, 7 figs. Discusses geodetic surveys of U. S. A., work and accuracy of triangulation astronomic observations, isostatic investigations, instruments used.

Hydrographic, Sounding Tube for. New Sounding Tube Devised for Hydrographic Surveying, G. T. Rude. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, pp. 806-807, 1 fig. Capillary block is added feature which gives device developed by U. S. Coast & Geodetic Survey accuracy in measuring water depth.

Instruments. Design and Construction of Surveying Instruments, W. H. Connell. Surveyor, vol. 34, no. 5, May 1924, pp. 270-277, 5 figs. Progress in construction of instruments; introduction of labor-saving devices, better workmanship, better guarding of vulnerable parts, reduction in dimensions and weight, greater rigidity, etc.

Manufacture of Surveying Instruments, W. L. Egy. Can. Engr., vol. 47, no. 10, Sept. 2, 1924, pp. 299-302, 3 figs. Discusses development of surveying and other engineering instruments; principle has not changed much but refinements in material and construction have been introduced. Abstract of paper read before Am. Water Works Assn.

New Instruments and Apparatus for Surveys. Eng. & Contracting (Water Works), vol. 61, no. 5, May 14, 1924, pp. 1085-1089, 6 figs. Recent developments of U. S. Coast and Geodetic Survey.

Land. Curve Problem Met in Land Surveying, J. T. Ransom. Can. Engr., vol. 46, no. 16, Apr. 15, 1924, pp. 430-431, 2 figs. New ready simple method for computing curved or chord frontages for a lot or series of lots of equal or varying widths with parallel sides on new subdivision surveys.

Leveling. See LEVELING.

Mapping. See MAPPING.

Mine. See MINES, Surveying.

North Carolina. Precise Triangulation, Traverse, and Leveling in North Carolina, W. D. Sutcliffe and H. G. Avers. U. S. Coast & Geodetic Survey—Special Pub. no. 101, Serial no. 260, 1924, 184 pp., 17 figs. partly on supp. plates. Results of all precise triangulation, precise traverse, and precise leveling which constitute horizontal and vertical control for North Carolina. Gives all data ordinarily needed for control of local surveys, describes methods employed in making triangulation and traverse observations, and discusses office computation, including final rigid least squares adjustment.

Photographic. See MAPPING, Photographic.

Photographic, Stereoscopic Plotting Machines. Stereoscopic Plotting Machines for Use in Photographic Surveying, H. St. J. L. Winterbotham. Roy. Engrs. Jl., vol. 38, no. 1, Mar. 1924, pp. 68-86, 20 figs. partly on supp. plates. Describes camera plastica, Nistri photocartograph, photogoniometer, autocartograph, and stereoplanigraph.

Stadia. See TACHEOMETRY.

Stereotopography. Stereotopography and Its Recent Progress (La stéréotopographie et ses récents progrés), J. Boyer. Nature (Paris), no. 2614, May 10, 1924, pp. 299-304, 7 figs. Discusses development of stereophotogrammetry by Pulfrich, and describes stereocomparator, and Orel stereoautograph; advantages of stereoautogrammetry.

Theodolites. A New Recording Theodolite (Ein neuer Registrier-Theodolit), F. Hennig. Deutsche Optische Wochenschrift, vol. 10, no. 27, July 6, 1924, pp. 348-349, 4 figs. Details of Hahn-Goerz apparatus so arranged that single observer can follow pilot balloon with microscope of theodolite.

The Illumination of Geodetic Measuring Instruments (Einige Mitteilungen über die Entwicklung der Beleuchtung von Messstellen an geodätischen Vermessungs-Instrumenten), K. Lüdemann. Zeit. für Instrumentenkunde, vol. 44, no. 2, Feb. 1924, pp. 33-43, 7 figs. Review of developments, with special reference to theodolites constructed by firm of M. Hildebrand, Freiberg. Bibliography.

See also MINES, Surveying Instruments.

Transits. Transits Without Stadia Wires, E. S. M. Lovelace. Can. Engr., vol. 47, no. 13, Sept. 23, 1924, pp. 365-366. Method of using a transit not fitted with stadia wires but having a vertical arc. Main requirements of proposed new instruments.

Triangulation. Practical Compensation for Accuracy of Trigonometric Nets (Compensazione pratica di precisione delle reti trigonometriche), G. Ferrario. Annali dei Lavori Pubblici, vol. 62, no. 4, Apr. 1924, pp. 309-326. Discusses divergence of triangulation work of Milan, doubt as to method of least squares, and proposes method for compensating errors of observation in triangulation.

SWAGING

Cranks. See AUTOMOBILES, Parts, Swaging of.

SWIMMING POOLS

Design. Designing Swimming Pools With Reference to Operation and Sanitation, J. J. Himman, Jr. Mun. & County Eng., vol. 66, no. 2, Feb. 1924, pp. 77-82. Explains why the ordinary tank is not a satisfactory swimming pool, and discusses some of the features which should be taken into account in design of this type of equipment.

Outdoor. Plans and Specifications for Outdoor Swimming Pools. Concrete Products, vol. 27, no. 1, July 1924, pp. 35-39, 10 figs. Discusses design of pools, materials, measuring and mixing, construction, concrete walls and floor, and surface finish.

Water Filtration. Continuous Filtration of the Bath Water of Swimming Baths, T. Thomas. Domestic Eng. (Lond.), vol. 44, no. 1, Jan. 1924, pp. 14-16. Description of three filtration plants; factors which should be considered in selection of filter. Abstract of paper read before 34th Congress of Roy. Sanitary Inst.

Operating Experiences With Regenerated Water at the Frankfort Public Baths (Betriebserfahrungen mit regeneriertem Badewasser im Frankfurter Hallenschwimmbad), M. Nowotny. Gesundheits-Ingenieur, vol. 47, no. 37, Sept. 13, 1924, pp. 405-407, 5 figs. Discusses developments since 1913 reducing water consumption to one-tenth and coal consumption to one-fifth. Cost data.

SWITCHBOARDS

Armorclad. Armourclad Compound-filled Switchgear Units. World Power, vol. 1, no. 2, Feb. 1924, pp. 124-126, 4 figs. Describes Ferguson-Pailin 3-phase unit for 300 amperes at 33,000 volts, consisting of two oil circuit breakers mounted together on one base and capable of being connected to either or both sets of duplicate busbars.

Design. Notes on the Design of Power Switchboards, E. G. Bern. Power Plant Eng., vol. 28, no. 5, Mar. 1, 1924, pp. 285-286, 3 figs. Discusses problem of design from point where system of connection has been drawn and equipment selected.

Safe Switchgear (Betriebssichere elektrische Schaltgeräte), W. Höpp. Elektrotechnische Zeit., vol. 45, no. 5, Jan. 31, 1924, pp. 69-74 and 91-98, 16 figs. Shows great value of mathematical analysis in correct design of different types of switches; for every switch mechanism a simple and transparent mathematical formula may be established which will give most efficient and dependable solution for particular device under consideration; notes on catch mechanism, toggle joints, and other mechanical releases found on all automatic breakers, showing best solutions for every case.

Erskine-Heap. Erskine Heap Switchgear. Engineering, vol. 118, no. 3055, July 18, 1924, pp. 106-108, 5 figs. Describes switchgear exhibited at British Empire Exhibition, by Erskine, Heap & Co., Ltd., Manchester, Eng. Panel is built of ironwork throughout, and truck portion carries a three-phase oil circuit breaker and potential and current transformers for instruments and trip coils.

High-Voltage. Switchgear and Induction Regulators. Engineering, vol. 118, no. 3057, Aug. 1, 1924, pp. 180-181, 5 figs. Details of Wembley Exposition of three-panel board for pressures up to 3300 volts and line currents up to 60 amperes; oil-immersed gate-end switches fitted with limited overload protection, draw-out truck type switchgear for three-phase working.

Ironclad. New E. H. T. Ironclad Switchgear. Power Engr., vol. 19, no. 215, Feb. 1924, pp. 66-67, 2 figs. New design of 6600-volt, 3-phase switchgear for currents up to 25 amperes intended for use in substations in outlying districts and in consumers' works.

Neasden Power Plant, England. New Switchgear at the Neasden Power Station. Engineer, vol. 137, no. 3551, Jan. 18, 1924, pp. 74-75, 9 figs. partly on p. 70. Describes switchgear, contact for which was carried out by Gen. Elec. Co., of Witton, Birmingham, for Neasden station of Metropolitan Ry.

Non-Ignitible. See INSULATING MATERIALS, ELECTRIC, Boards and Moldings.

Panels, Truck-Type. English-Electric Truck-Type Switchgear. Elec. Rev., vol. 94, no. 2416, Mar. 14, 1924, p. 435, 2 figs. New iron-clad truck type of "draw-out" switchgear for use in substations and also in generating stations.

Removable Truck Type Panels, H. E. Starbuck. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 293-297, 7 figs. Describes panels for power-house switchboards.

Testing. Checking Switchboard-Instrument Connections, R. Brown. Power, vol. 60, no. 7, Aug. 12, 1924, pp. 253-254, 8 figs. Gives diagrams of methods for checking instrument connections and explains application.

SWITCHES

Electric. See ELECTRIC SWITCHES.

Railway. See RAILWAY SWITCHES.

SYMBOLS

Engineering, French. See ABBREVIATIONS.

SYNCHRONOSCOPE. See ELECTRIC MEASURING INSTRUMENTS, Synchronoscope.

T

TABULATING MACHINES

Improved Type. A New Type of Tabulating Machine. Engineer, vol. 137, no. 3559, Mar. 14, 1924, pp. 274-276, 4 figs. Describes improved type of machine, by which mechanical accountancy and statistical analysis have been made all but independent of human element.

TACHEOMETERS

Kourkene. The Kourkene Tacheometer (Le tachéomètre, système Kourkène). Génie Civil, vol. 85, no. 7, Aug. 16, 1924, pp. 154-157, 9 figs. Design and construction of direct-reading apparatus made by Précision Moderne at Paris, measuring heights as well as distances.

TACHEOMETRY

Horizontal. Horizontal Tacheometry, C. H. Ley, Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 505-507, 9 figs. Describes experiments carried out in Palestine; refers to taking of readings for range on tacheometric staff of two stadia lines at fixed distance apart in diaphragm of tacheometer; also to method invented by Prof. Oltay of Budapest, by which reading of single central line in diaphragm can be shifted through necessary optical interval by means of prism hinged in front of object glass of instrument.

TACHOMETERS

Speed-Indicating-and-Recording. Speed Indicating and Recording. Shipbldg. & Shipg. Rec., vol. 24, no. 6, Aug. 7, 1924, p. 171, 2 figs. Description of electrical tachometer equipment.

TACKS

Manufacture. Making Plain and Headless Tacks, H. R. Simonds. Iron Trade Rev., vol. 74, no. 13, Mar. 27, 1924, pp. 861-865, 7 figs. Traces history of tack manufacture, and describes some operations.

TALC

Use in Paper Making. See PAPER MANUFACTURE, Talc, Use in.

TANKS

Horizontal, Contents Determination. A Quick and Useful Horizontal Tank Chart, W. F. Schaphorst. West. Machy. Wld., vol. 15, no. 7, July 1924, pp. 227-228, 1 fig. Chart gives gallons of liquid in any horizontal tank without use of tables, formulas, figures, or computations of any kind. Inversely, chart may be used for determining length of tank necessary to hold given number of gallons where diameter of tank and depth of liquid are known.

How to Find the Contents of Horizontal Storage Tanks, Jos. B. Reynolds, and Sam Cottrell. Chem. & Met. Eng., vol. 31, no. 17, Oct. 27, 1924, pp. 665-667, 1 fig. Table and explanation that simplifies calculation for one type of tank and can be easily applied to other types.

Military. See TANKS, MILITARY.

Oil. See OIL TANKS.

Reinforced-Concrete. Molasses Tank of the Kronos Factory in Eleusis near Athens (Die Melassebehälter der Fabrikanlage "Kronos" in Eleusis bei Athen), P. P. Santo Rini. Beton u. Eisen, vol. 23 no. 15, Aug. 5, 1924, pp. 193-197, 10 figs. Details of tank construction and system of reinforcing, tank capacity 4000 cu. m. or 6000 tons molasses.

TANKS, MILITARY

Developments. The Tank, A. C. Cron. Coast Artillery Jl., vol. 61, no. 5, Nov. 1924, pp. 383-395, 7 figs. British, French, German, and American tanks in world war; post-war development; organization; tank tactics.

TANNING. See LEATHER, Tanning; Tanning Materials.

TAPS

Breakage, Prevention of. See MACHINE TOOLS, Safety Tapping Mechanisms.

Manufacture. Taps and Tapping, H. Appleyard. Mech. Wld., vol. 75, no. 1954, June 13, 1924, pp. 366-367, 11 figs. Description of how taps are made.

Standard Tolerances for. Standardizing Tolerances for Taps, Chas. C. Winter. Am. Mach., vol. 60, no. 16, Apr. 17, 1924, pp. 593-594. Discussion of article by W. Daley published in same journal, vol. 60, no. 16, p. 217.

See also TOLERANCES, Taps, Standardization for.

TAR

Asphalt, for Roofing. Flow of Asphalt Tar (Goudron), K. S. Zarembo. Petroleum & Oil-Shale Industry, vol. 5, no. 7-8, July-Aug. 1923, pp. 95-99, 3 figs. Method of determining flow of asphalt tar, as this property has special bearing on manufacture of so-called improved tar roofing materials. (In Russian.)

Distillation. Tar Distillation—Crude Derivatives and Uses, J. H. Readio. Gas Age-Rec., vol. 53, nos. 8 and 9, Feb. 23 and Mar. 1, 1924, pp. 213-218 and 224, and 251-254 and 259-260, 15 figs. Historical references to use of tar; sources and types of tar and peculiarities of type; values of tars to refiners; tar dehydration; tar refinery; use of tar products and their distinctive properties.

Lignite. Examination and Treatment of Lignite Tar (Untersuchung und Aufarbeitung von Braunkohlenteeren), W. Franckenstein. Zeit. für angewandte Chemie, vol. 37, no. 45, Nov. 6, 1924, pp. 878-882. Discusses methods of distillation, including vacuum and steam distillation, and gives a tabular statement of products resulting.

See also LIGNITE, Oil Recovery from.

Road. See ROADS, TARRED, Consistency of Tars.

Waste Emulsions, Dehydration of. Dehydrating Waste Emulsions, G. A. Simmons. Gas Age-Rec., vol. 54, no. 25, Dec. 20, 1924, pp. 859 and 864, 1 fig. Describes new method by which waste emulsions other than those of coal gas tar are successfully dehydrated.

Water Content. Water Content of Tar (Der Wassergehalt im Teer), O. Pfeiffer. Gas- u. Wasserfach, vol. 67, no. 35, Aug. 30, 1924, pp. 521-523. Three samples of tar from same gas works, containing respectively 3, 4, and 13.8 per cent of water, were subjected to distillation test and also examined for free carbon; average sample was then agitated with water and allowed to settle for 3 days, and samples from various depths were subjected to similar tests; results show fall in specific gravity, slight rise in constituents of lower boiling point, and rise in free-carbon content with increase in proportion of water present; analyses sufficiently explain unsatisfactory results of attempts to separate this water by centrifuging.

TAXICABS

Brakes. See AUTOMOBILES, Four-Wheel Brakes.

TELEGRAPH LINES

Earthquake Damages, Japan. A Brief Description of the Damages Done by the Earthquake to the Wired and Wireless Telegraph and Telephone Installations of Japan, S. Inada. Elec. Communication, vol. 3, no. 2, Oct. 1924, pp. 79-102, 21 figs. Damages to telegraph installations, telephone, radio stations, laboratory installations; lessons learned from disaster. Program of reconstruction executed and otherwise.

Inductive Interference. See TELEPHONE LINES, Inductive Interference.

Interference, Power-Circuit. Power Circuit Interference with Telegraphs and Telephones, S. C. Bartholomew. Instn. Elec. Engrs.—Jl., vol. 62, no. 334, Oct. 1924, pp. 817-858 and (discussion) 858-878, 52 figs. General survey of position, describing features in modern generation and distribution of electrical energy which are responsible for interference with telegraph and telephone circuits, emphasizing importance of harmonics in this connection, and indicating some known reme-

dies applicable to power plant at its source when trouble is experienced; review of problem and general experience in England. Appendix, describing method of removing ripples from mercury-arc rectifiers. Bibliography.

Railway Construction, 1923. Telegraph and Telephone Construction, J. H. Dunn. Ry. Age, vol. 76, no. 1, Jan. 5, 1924, pp. 73-75. Pole-line reconstruction and telephone dispatching and message circuits leading activities.

TELEGRAPHY

A.C. Over Underground Cables. A. C. Telegraphy Over Underground Cables (Wechselstrom-Telegraphie auf Kabeln). Siemens-Zeit., vol. 4, no. 1, Jan. 1924, pp. 27-30, 4 figs. Describes system of a.c. multiplex telegraphy developed in Werner Works laboratory of Siemens & Halske Corpn.

Baudot Apparatus. See Printing Systems.

Cables. See CABLES, ELECTRIC, Telegraph.

Carrier-Current. Telegraph Systems, F. J. Singer. Wis. Engr., vol. 28, no. 6, Mar. 1924, pp. 111-113, 1 fig. Discusses carrier-current systems in general, and describes multiplex carrier-current telegraphy; application of carrier telegraphy in Bell system.

Electromagnets. Improvement of Electromagnets Used in Telegraphy and Telephony (Amélioration des électro-aimants employés en télégraphie ou en téléphonie), J.-H. Gosselin. Annales des Postes Télégraphes et Téléphones, vol. 13, no. 10, Oct. 1924, pp. 1028-1040, 7 figs. Discusses theory, magnetic flux, increase of attraction, decrease of adhesion due to residual magnetism, relays, etc.

Minniotti Automotic System. The Minniotti Telegraph System, V. Castelli. Telegraph & Telephone Jl., vol. 10, no. 108, Mar. 1924, pp. 92-93, 1 fig. Describes new system of automatic telegraph transmission, invention of G. Miniotti, an Italian, in which process is same as with perforated slip with exception that signals are mechanically stored by use of balls which, once having effected transmission, return to be re-accumulated for further signals.

Multiplex. Multiplex Telegraphy and Telephony at Carrier Frequencies (Mehrfach-Telegraphie und Telephonie mit Trägerfrequenzen), E. Gendriess. Elektrotechnischer Anzeiger, vol. 41, nos. 170-171 and 172, Oct. 23 and 25, 1924, pp. 949-950 and 957-958, 3 figs. Discusses sextuplex telegraphy at voice frequencies and gives wiring diagrams for sending and receiving.

Oscillations in Circuits. Forced Oscillations in Two Tuned Circuits Coupled by Iron Core Coils (Erzwungene Schwingungen in zwei abgestimmten Schwingungskreisen, die durch Eisenkernspulen gekoppelt sind), L. Casper, K. Hubmann and J. Zenneck. Jahrbuch der drahtlosen Telegraphie u. Telephonie, vol. 24, no. 4, 1924, pp. 79-84, 9 figs. Examines forced oscillations in condenser circuits and their resonance curves.

Printing Systems. The Teletype, Description and Operation (Le télétype, description et fonctionnement). Annales des Postes Télégraphes et Téléphones, vol. 13, no. 8, Aug. 1924, pp. 911-925, 7 figs. Details of design of Baudot apparatus, formation and transmission of signs, printing mechanism, translating figures into letters and vice versa.

Transmission by Means of Perforated Slip and Page Reception with Baudot Apparatus, J. Jacob. Post Office. Engrs.' Jl., vol. 17, Part 2, July 1924, pp. 97-110. Demonstrates origin and peculiarities of 5-impulse codes and points out that with use of perforated slips choice of so-called "universal" keyboard becomes as important as that of unique code. From Technique Moderne, nos. 8 and 9, Apr. 24, 1924.

Railway. Telegraph and Telephone Practice, Chas. S. Rhoads. Ry. Signaling, vol. 17, nos. 5 and 6, May and June 1924, pp. 212-214 and 250-252, 9 figs. May: Special circuits and applications of Western Electric selectors for railroad communication. June: Western Electric selectors for time sending with branch-line connection.

Speed Factors. Certain Factors Affecting Telegraph Speed, H. Nyquist. Am. Inst. Elec. Engrs. —Jl., vol. 43, no. 2, Feb. 1924, pp. 124-130, 3 figs. Discusses following factors: (1) signal shaping, i.e., giving signals best wave shape before impressing them on transmitting medium; and (2) choice of codes so as to transmit maximum amount of intelligence with given number of signal elements; also discusses certain telegraph systems which have been advocated.

Stations. Lowestoft Telegraph Repeater Station (LWV) (England), J. A. S. Martin. Post Office Elec. Engrs.' Jl., vol. 16, Pt. 4, Jan. 1924, pp. 295-300, 4 figs. Is relaying point for three Dutch and two German cables; description of equipment.

Submarine. Rapid Telegraphy With Ocean Cables (Schnelltelegraphie auf Ozeankabeln), K. W. Wagner. Elektrische Nachrichten-Technik, vol. 1, no. 4, Oct. 1924, pp. 114-137, 34 figs. Deals with Thomson and Krarup cables. Construction of Krarup cables for rapid operation; Krarup sheaths of nickel-iron alloys; velocity of telegraphing. Duplex operation.

Wired Wireless. See TELEPHONY, Wired Wireless.

Wireless. See RADIOTELEGRAPHY.

TELEMETERS

Electrical. A New Electrical Telemeter, B. McCollum and O. S. Peters. U. S. Bur. Standards—Technologic Papers, no. 247, Jan. 4, 1924, pp. 737-777, 24 figs., partly on supp. plates. Fundamental principles and applications of instrument for measurement of strains, forces, displacements, and accelerations; can be made remote reading or remote recording, and adapted to measurement of quantities that are rapidly varying in value.

TELEPHONE LINES

Construction. The Telephone Pole Line, P. K. Higgins. Telephone Engr., vol. 28, no. 5, May 1924, pp. 17-20, 4 figs. Fittings, setting of poles, guying, weight and strength of wire, factors affecting pole lines, insulator facts; stringing line; collection of valuable pole data.

Disturbances. Cross-Talk in Duplex Telephone Lines (Oeverhörning i duplicerade telefonkablar), A. Engelhardt. Teknisk Tidskrift, vol. 54, no. 1, Jan. 5, 1924, pp. 12-14 (Elektroteknik), 6 figs. Short review of disturbances which occur in telephone cables with duplex circuits and most important of the available means for elimination of these disturbances.

Earthquake Damages, Japan. See TELEGRAPH LINES, Earthquake Damages, Japan.

Impedance. Impedance of Loaded Lines, and Design of Simulating and Compensating Networks, R. S. Hoyt. Bell System Technical Jl., vol. 3, no. 3, July 1924, pp. 414-467, 22 figs. Discusses impedance of non-dissipated loaded lines as function of frequency and line contacts, and networks for simulating and compensating impedance of loaded lines.

Inductive Interference. Communication Circuits. Electrician, vol. 92, no. 2394, Apr. 4, 1924, pp. 420-421, 4 figs. Electrostatic and electromagnetic disturbances that occur in telephone and telegraph lines in proximity to single-phase power circuits. From article by A. Holmgren in Teknisk Tidskrift, Apr. 1923.

Influence of Three-Phase Transmission Lines on Telephone Circuits (Beeinflussung von Schwachstromleitung durch Drehstromleitungen), Odenbach. Organ für die Fortschritte des Eisenbahnwesens, vol. 79, no. 12, Sept. 30, 1924, pp. 276-278, 11 figs. on supp. plate. Report on extensive tests carried out by German Nat. Rys. Diagrams of connections, and oscillograms.

Telegraphy and Telephony. Sci. Abstracts, vol. 27, part 6, June 25, 1924, pp. 317-328. Details of investigation by Swedish Telegraph Administration into interference by single-phase railway power lines with special reference to Stockholm-Göteborg electrification, telephone lines to be moved 200 m. from power line.

See also ELECTRIC TRANSMISSION LINES, Inductive Interference.

Interference. See TELEGRAPH LINES, Interference, Power-Circuit.

Poles. Telephone Pole Line Data, P. K. Higgins. Telephone Engr., vol. 28, no. 8, Aug. 1924, pp. 18-20, 5 figs. Importance of good guying calls for some additional information on that subject; factors affecting its efficiency; some typical guying conditions described; special guying problems.

Testing. Electrical Tests and Their Applications in the Maintenance of Telephone Transmission, W. H. Harden. Bell System Technical Jl., vol. 3, no. 3, July 1924, pp. 353-392, 32 figs. Details of more important electric testing methods and their application in maintaining transmission efficiency, including d.c. and a.c. methods.

Wire. Tells of "Happy Medium" Wire, P. K. Higgins. Telephone Engr., vol. 28, no. 10, Oct. 1924, pp. 28, 30, 32 and 34. Performance of copper-clad wire and characteristics of product. Method of welding copper and steel. Aluminum wire data.

Wire for. See WIRE, Telephone.

TELEPHONY

Amplifiers. Development and Present Status of Amplifiers in Germany (Entwicklung und gegenwärtiger Stand der Verstärkertechnik in Deutschland), K. Höpfner. Elektrotechnische Zeit., vol. 45, no. 7, Feb. 14, 1924, pp. 109-113, 10 figs. Describes amplifier tubes, connections, etc., used in Germany; and shows how amplifiers in 2-phase and 4-phase system in long-distance cable network are arranged in order to obtain a good connection.

The Interior Arrangement of an Amplifier Station (Innere Einrichtung eines Verstärkeramts), K. Höpfner. Elektrotechnische Zeit., vol. 45, no. 9, Feb. 28, 1924, pp. 156-158, 7 figs. Describes necessary equipment of amplifier station and arrangement of different apparatus in building.

Transmission of Speech over Long Cable Lines (Sprachübertragung in langen Fernkabelleitungen), K. Höpfner and B. Pohlmann. Elektrotechnische Zeit., vol. 45, no. 8, Feb. 21, 1924, pp. 135-137, 3 figs. Describes use of amplifiers for increasing audibility over long-distance lines.

Apparatus Construction. See INSTRUMENTS, Design and Construction.

Atmospheric Conditions, Effect of. Humidity Recorders, E. B. Wheeler. Bell System Technical Jl., vol. 3, no. 2, Apr. 1924, pp. 238-258, 14 figs. Outline of some of the work which has been done in an effort to obtain information showing character of atmospheric conditions which exist in typical localities where telephone equipment is installed so that effects of these conditions on proposed designs may be studied under carefully controlled similar conditions in laboratory "humidity rooms." Development of a recording hygrometer. Laboratory tests and field trials. A new direct-reading humidity recorder.

Automatic. Automatic Switching of Toll Traffic, A. B. Smith. West. Soc. Engrs.—Jl., vol. 29, no. 2, Feb. 1924, pp. 45-64, 24 figs. Means which are used in setting up toll telephone connections by automatic switches; historical development, and present status of this branch of telephony.

Automatic Telephony Impulses, C. W. Brown. Post Office Elec. Engrs.' Jl., vol. 17, part 2, July 1924, pp. 128-134, 7 figs. Results of investigations by Research Sec., Engineer-in-Chief's Dept., British Post Office, into question of distortion of impulses transmitted over lines with different local conditions.

Bases of Automatic Connection and Its Effect on the Form of the System (Die Grundlagen des Selbstanschlussbetriebs und sein Einfluss auf die Netzgestaltung), A. Kruckow. Telegraphen- u. Fernsprech- Technik, vol. 13, no. 5, May 1924, pp. 53-68, 22 figs. Discusses systems of selection and successive steps in connecting, semi-automatic and fully automatic; cost of plants, slowness in adoption, details of Berlin and Hamburg dialing system with A, B, C, etc., for central stations, application of system to provinces, etc.

Dundee and Broughty Ferry Automatic Exchanges, W. Ireland and F. A. Ellson. Post Office Elec. Engrs.' Jl., vol. 16, Pt. 4, Jan. 1924, pp. 322-345, 20 figs. Description of new automatic telephone system developed by Gen. Elec. Co. for use in England, based on that of North Elec. Co., Galion, Ohio, U. S. A.

Post Office Exhibit. British Empire Exhibition, Wembley, F. I. Ray and W. E. Hudson. P. O. Elec. Engrs.' Jl., vol. 17, part 3, Oct. 1924, pp. 185-197, 3 figs. The A. T. M.'s coder call indicator; considers problem of dealing with calls to manual exchanges when multi-office area is being changed from manual to automatic operation.

"Relay" Private Automatic Branch Exchange for Debenhams, Ltd., London. Telegraph & Telephone Jl., vol. 10, no. 107, Feb. 1924, pp. 83-84, 4 figs. Has initial equipment of 400 lines and an ultimate capacity of 1270; description of installation and equipment.

Some Notes on the Use of the Probability Theory to Determine the Number of Switches in an Automatic Telephone Exchange, M. Merker. Post Office Elec. Engrs.' Jl., vol. 16, Pt. 4, and vol. 17, Pt. 1, Jan. and Apr. 1924, pp. 347-362 and 27-50, 4 figs. Calculations. See also Annales des Postes Télégraphes & Téléphones, vol. 13, no. 3, Mar. 1924, pp. 299-345, 4 figs.

Strowger Automatic in Canal Zone, H. E. Clapham. Telephony, vol. 87, no. 3, July 19, 1924, pp. 32-34, 4 figs. Complete conversion of Canal Zone telephone system to Strowger automatic operation; initial installation will have capacity of approximately 3000 lines distributed among four central offices.

Strowger Director System in Havana, H. E. Clapham. Telephone Engr., vol. 28, no. 12, Dec. 1924, pp. 38-39, 6 figs. See also Telephony, vol. 87, no. 24, Dec. 13, 1924, pp. 25-28, 8 figs. Director trunking in Havana network meets with gratifying success. Notes on what director accomplishes and how it simplifies trunking plan of a large city network.

See also Brussels.

Berlin. Traffic, Technics, Operation and Personnel of Berlin Trunk Line Office (Verkehr, Technik, Betrieb und Personal beim Fernamt Berlin), W. Schneider. Telegraphen- u. Fernsprech-Technik, vol. 13, no. 10, Oct. 1924, pp. 141-158, 7 figs. Details of traffic development during 1912-1924 in curves. Technical equipment of Berlin office, operations, interruption service, instruction of operators, etc.

British Empire Exhibition. P. O. Telephone Exhibit at the British Empire Exhibition. Post Office

Elec. Engrs.' Jl., vol. 17, part 2, July 1924, pp. 112-128, 8 figs. on supp. plate. Article by W. E. Hudson describes A. T. M. Co.'s director system and article by F. I. Ray describes Mechanical Tandem exchange.

Brussels. Equipment of the Telephone Lines of Brussels on the Automatic System (L'équipement du réseau téléphonique de Bruxelles d'après le système automatique), A. Bocquet. Assn. des Ingénieurs Electriciens sortis de l'Institut Electrotechnique Montefiore—Bul., vol. 2, series 7, nos. 3 and 5, Mar. and May 1924, pp. 74-97 and 176-192, 20 figs. Discusses development of Brussels telephone system; details of MacBerty system installed by Antwerp Bell Co., automatic system, dialing arrangements, Western Electric rotary system; comparison of manual, semi-automatic, and automatic systems.

Cable Distribution. Economical Cable Plant, E. K. Goss. Telephone Engr., vol. 28, no. 7, July 1924, pp. 17-18. Some engineering features involved in laying out economical system of cable distribution for small and moderate-sized exchanges; methods of relief and multipling.

Cables. See CABLES, ELECTRIC, Telephone.

Carrier-Current. Carrier Telephony on Power Lines, N. H. Slaughter and W. V. Wolfe. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 377-381, 7 figs. Review of development and problems. See (discussion) in vol. 44, no. 1, Jan. 1925, pp. 65-69, 7 figs.

Carrier-Current Telephony on the High-Voltage Transmission Lines of the Great Western Power Company, J. A. Koontz, Jr. Am. Inst. Elec. Engrs. —Jl., vol. 43, no. 2, Feb. 1924, pp. 122-123. Describes power circuits and radio equipment used in carrier-current system; method of calling employed, and use of system as trouble detector and recorder of switch operation.

Carrier-Wave. Carrier Wave Telephony, W. Hilarius. S. African Inst. Elec. Engrs.—Trans., vol. 15, part 10, Oct. 1924, pp. 474-480 and (discussion) 480-484, 15 figs. Deals with method of producing carrier wave and of superimposing speech frequency upon former; studio microphones and methods of amplification.

Circuit Unbalances. Telephone Circuit Unbalances, L. P. Ferris and R. G. McCurdy. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1133-1141, 14 figs. Determination of magnitude and locating; discusses different types of unbalance, and their effects under different conditions of energization of unbalanced circuit and neighboring conductors. (Abridgment.)

Circuits, Reflection Losses in. Reflection Losses in Telephone Circuits, K. Ogawa. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 435, Oct. 1924, pp. 920-928, 2 figs. Proposes that reflection loss should be expressed by ratio of electric power in circuit, and derives formula for reflection loss from this standpoint; gives diagram which shows how reflection loss varies for various impedances of circuit; investigates coefficient of reflection by a diagram. (In Japanese.)

Circuits, Transmission Efficiency. Measuring Methods for Maintaining the Transmission Efficiency of Telephone Circuits, F. H. Best. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 136-144, 14 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1199-1201. Transmission characteristics of common types of telephone circuits; general method for measuring their transmission efficiency; describes modern types of transmission measuring sets, together with brief mention of oscillators which supply power for testing.

Clock-Controlled Tuning Fork. A Clock-Controlled Tuning Fork as a Source of Constant Frequency, J. C. Ferguson. Bell System Tech. Jl., vol. 3, no. 1, Jan. 1924, pp. 145-157, 5 figs. Methods recently developed in Bell System Laboratory for obtaining source of practically constant frequency with which other frequencies may be compared; study has been made for improving constancy of control clock and new type of clock mechanism, consisting of electrically actuated pendulum, impulse of which is controlled by photo-electric cell, is suggested.

Coils. See COILS, Pupin; Telephone.

Developments. Developments in Manual Operation, J. P. Boylan. Telephony, vol. 87, no. 3, July 19, 1924, pp. 21-23, 2 figs. Recent improvements in manual switchboard practice; straightforward trunking system developed for Rochester Co.; innovations of new board.

Economics in Telephony (Wirtschaftliches im Fernsprechwesen), F. J. Dommerque. Zeit. für Fernmeldetechnik, vol. 5, no. 10, Oct. 16, 1924, pp. 93-95. Discusses introduction of automatic systems; use of electron tubes as amplifiers; telephone cables; combined use of lines and conduits for telephone, lighting and power transmission; reduced diameter of conductors; and operation economics.

Electrostatic Telephone. The Electrostatic Telephone (Le téléphone electrostatique), K. Dobrski. Revue Générale de l'Electricité, vol. 15, no. 14, Apr. 5, 1924, pp. 571-577, 5 figs. Mathematical study of electrostatic telephone which is simply an air condenser, armatures of which are mica plates fitted with tin; in order to successfully employ electrostatic in place of electromagnetic telephone, it is necessary to adapt transformer to new conditions; gives formula of efficiency.

Europe. The Telephone in Europe (La téléphonie en Europe). Industrie Electrique, vol. 33, no. 771, Aug. 10, 1924, pp. 508-511. Discusses situation of long-distance telephony, whether overhead or underground lines, opinions in various countries, principal long distance lines, financial and economic aspects.

European Long-Distance. European Long-Distance Telephony. P. O. Elec. Engrs.' Jl., vol. 17, part 3, Oct. 1924, pp. 198-208. Results of meeting at Paris of telephone experts from Belgium, France, Great Britain, Italy, Spain and Switzerland; recommendation on administration; transmission and engineering construction; engineering maintenance, including removal of faults; traffic; program of immediate additional construction work; preliminary program of further construction work.

Exchanges. Modern Developments in Telephone Exchanges for Local and Long-Distance Traffic (Die neuzeitliche deutsche Entwicklung des Fernsprechämterbaus für den Orts- und Fernverkehr), A. Kruckow. Elektrotechnische Zeit., vol. 45, nos. 46 and 47, Nov. 13 and 20, 1924, pp. 1233-1238 and 1273-1278, 37 figs. Describes an example of an exchange with 20,000 connections; influence of automatic calling; details of connecting system in Berlin for long distance; amplifier office and equipment; etc.

Exchanges, Current for. Current-Consumption in Large Telephone Centrals (Die Stromversorgung grosser Telephonzentralen), K. Schmidt. Elektrotechnische Zeit., vol. 45, no. 27, July 3, 1924, pp. 708-710, 5 figs. Shows that storage batteries may be effectively eliminated without reducing safety in operation.

Recent Development in Current Supply Plants for the Larger Centrals (Die neuere Entwicklung der Stromversorgungsanlagen bei grösseren Fernsprechämtern), M. Clausen. Telegraphen u. Fernsprech- Technik, vol. 13, no. 6, June 1924, pp. 71-80, 8 figs. Discusses current supply at German telephone centrals, batteries and charging, parallel connection of dynamo and battery, current consumption, use of one battery in place of two, etc.

Future Expansion, Preparing for. Telephone Engineering With Special Reference to Preparing for Future Expansion, A. P. Allen. Armour Engr., vol. 15, no. 3, Mar. 1924, pp. 87-90 and 114, 4 figs. Brief description of steps usually followed by engineers in preparing a long term commercial survey of a telephone exchange area like Chicago.

Induction from High-Power Parallel. Induction from High Power Parallel, F. A. Puchstein. Telephony, vol. 86, no. 22, May 31, 1924, pp. 16-19, 10 figs. An analytical method of making an estimate of voltage induced in an open-wire telephone circuit of an Ohio company over a 7-mile exposure by a 66,000-volt 3-phase power line having no transpositions.

Inductive Interference in Cables. Inductive Interference in Telephone Cables (Abgleichverfahren zur Beseitigung der Induktionsstörungen), K. Dohmen and K. Küpfmüller. Elektrotechnische Zeit., vol. 45, no. 13, Mar. 27, 1924, pp. 266-289, 10 figs. Points out six disadvantages of transposition method used by American concerns to reduce inductive interference between individual pairs of conductors within telephone cable; compares system with principle of German origin whereby properly dimensioned small condensers are introduced into cable, placed conveniently within cable junction boxes; advantages of this method; curves showing damping values of such cable for various frequencies.

Long-Distance. Arrangement of Railway Long-Distance Lines Along A. C. Railway Lines (Die Einrichtungen für Bahnfernmeldeleitungen längs Wechselstrombahnen), I. Oefverholm. Elektrische Nachrichten-Technik, vol. 1, no. 4, Oct. 1924, pp. 107-114, 8 figs. Experience in Sweden on Svartön-Riksgränsen, Nordmark-Klarälven, and Stockholm-Göteborg lines, showing that overhead lines at a distance of 100 m. or more from line are not satisfactory. Advocates use of suction transformers and insulated return line.

Long-Distance Telephony (Das Fernsprechen auf weite Entfernung), K. W. Wagner. Elektrotechnische Zeit., vol. 45, nos. 1 and 2, Jan. 3 and 10, 1924, pp. 1-6 and 25-29, 15 figs. General review of subject; principles on which long-distance connection is based, and application of these principles in German telephone lines and system; according to present status of development it is possible to establish telephonic communication between all parts of Europe.

Long Distance Transmission, K. W. Wagner and J. F. Dommerque. Telephone Engr., vol. 28, nos. 5 and 6, May and June 1924, pp. 26-28 and 21-23, 7 figs. Discussion of transmission theory and practice as applied in modern long distance telephone plant. Some technical and economic features of application of repeaters to long distance lines. Cross-talk and balancing of cable pairs.

Loud Speakers. New Type of Loud Speaker (Présentation des haut parleurs "S.E.G." de la Société des Etablissements Gaumont), M. Bonneau. Société Française des Electriciens—Bul., vol. 4, no. 32, Feb. 1924, pp. 157-182, 15 figs. Gaumont Establishment has developed loud speaker along entirely new lines, which, it is claimed, has clearness of reproduction heretofore unknown; instead of reproducing sounds by more or less pronounced vibration of steel membrane before electrically controlled permanent magnet, new loud speaker has very strong, closed electromagnetic d.c. field with fine conically shaped air gap, within which is placed vibrating cone, which vibrates in perfect accordance with frequency of telephone current. See also description in Génie Civil, vol. 84, no. 22, May 21, 1924, pp. 526-528, 4 figs.

The Public Address System at the British Empire Exhibition. Engineering, vol. 117, no. 3043, Apr. 24, 1924, pp. 560-561, 5 figs. Account of apparatus employed for rendering speech audible over entire stadium.

See also RADIOTELEGRAPHY, Loud Speakers.

Meters and Coin-Collecting Boxes. Telephone Meters and Coin Collecting Boxes, W. Cruickshank & F. McClarence. Instn. Post Office Elec. Engrs., no. 92, Mar. 13, 1923, 61 pp. 19 figs. Methods of counting number of calls made by telephone users, and modern types of coin-collecting boxes. Considers methods adopted by other public utility administrations for purpose of measuring consumption by individual renters and compares relative accuracy of various systems.

Microphones. See MICROPHONES.

Multiplex. See TELEGRAPHY, Multiplex.

Norway. Modern Telephony. The Connection of Norway to a European Telephone System (Moderne Telefoni. Og norges tilknytning til et Europaeisk telefonnet), M. Abild. Teknisk Ukeblad, vol. 71, nos. 25 and 26, Aug. 6 and 12, 1924, pp. 216-219 and 227-229, 4 figs. Theory of damping of different types of telephone conductors is explained. Discusses existing European long-distance telephone lines and connection of Norway by cable to Denmark, Germany, and England.

Probability Calculation. Applying Probability Calculation to Telephone Operations (Application du calcul des probabilités à l'exploitation téléphonique), A.-E. Vaulot. Revue Générale de l'Electricité, vol. 16, no. 11, Sept. 13, 1924, pp. 411-418. Applies probability to number of connections made at automatic central; discusses formula of Erlang, determines number of unsuccessful calls, etc.

Pupin Coils. See COILS, Pupin.

Railway. See TELEGRAPHY, Railway.

Receivers. Motional Mutual Impedance of Telephone Receivers, H. Nukiyama and M. Matulaira. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 431, June 1924, pp. 564-574, 5 figs. Theory of motional mutual impedance of receiver, and theory and experimental results of determination of mechanical constants of vibrating system. (In Japanese.)

Relays, Electromagnets for. See ELECTROMAGNETS, Telephone Relays.

Research Laboratories. See LABORATORIES, Bell-System Research.

Signals, Ocular. Ocular Signals for Telephone Exchanges (Städte-Lichtrufeinrichtung für Fernsprechanlagen), G. Schmidt. Siemens-Zeit., vol. 4, no. 10, Oct. 1924, pp. 333-336, 11 figs. Describes light signals used at Hamburg, Berlin, Frankfurt, etc., and their management.

Strowger System. See Automatic.

Transformers. See TRANSFORMERS, Telephone.

Transmission Efficiency. Practises in Telephone Transmission Maintenance Work, W. H. Harden. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 12, Dec. 1924, pp. 1124-1128, 10 figs. Presents general picture of practical applications of methods of measuring transmission efficiency in Bell System which have been developed by study and experience under plant-operating conditions.

Some Factors in Good Transmission, J. D. Taylor. Telephony, vol. 86, no. 11, Mar. 15, 1924, pp. 12-15, 6 figs. Replacing rusty joints, cutting in transpositions to reduce crosstalk or inductive interference, cleaning switchboard plugs and replacing wornout plugs and jacks makes big improvement at small cost.

The Transmission Unit and Telephone Transmission Reference Systems, W. H. Martin. Am. Inst. Elec. Engrs.—Jl. vol. 43, no. 6, June 1924, pp. 504-507, 1 fig. Considers method of determining and expressing transmission efficiencies of

telephone circuits and apparatus, and of desirable qualifications for unit in which to express these efficiencies; "transmission unit" described has been selected as being much more suitable for this purpose under present conditions than "mile of standard cable" which has been generally used in past.

Transmission Maintenance. Transmission Maintenance of Telephone Systems, P. E. Erikson and R. A. Mack. Instn. Elec. Engrs.—Jl., vol. 62, no. 332, Aug. 1924, pp. 653-679 and (discussion) 679-687, 19 figs. Deals with broad aspects of modern telephone transmission maintenance, economic justification for good maintenance, and general lines upon which it should be carried out. Theoretical considerations leading up to development of a series of testing instruments, by means of which transmission losses in any part of telephone system can easily be measured. Brief descriptions of instruments and their use.

Transmission Unit. The Transmission Unit, R. V. L. Hartley. Elec. Communication, vol. 3, no. 1, July 1924, pp. 34-42, 1 fig. "Transmission unit" was found most suitable for present conditions in telephone art; discusses nature of unit, reasons for using power ratio, size of unit, logarithmic base, transmission reference system, and numerical relations.

Transmitter Circuit. Transmitter Circuit Theory, A. F. Puchstein and W. H. Snook. Telephone Engr., vol. 28, no. 9, Sept. 1924, pp. 23-25, 5 figs. Analytical study of transmitter circuit with extension of alternating-current theory and its application in local battery and common battery circuits.

Trunk Development. Post War Trunk Telephone Development, H. G. Trayfoot. Telegraph & Telephone Jl., vol. 10, nos. 110 and 111, May and June 1924, pp. 136-140 and 155-159, 12 figs. Amalgamation of trunk and local exchanges; general arrangement and grouping of long distance circuits; junction, or no delay, services; traffic development and trunk line provision; Anglo-continental telephone service; direct dialling over trunk lines to automatic exchanges; quality of service and circuit loads; transmission; fixed time calls.

Trunking, Manual. Improved Manual Trunking, J. P. Boylan. Telephone Engr., vol. 28, no. 6, June 1924, pp. 17-20. Development of straightforward trunking methods and equipment; elimination of call wire and addition of other features make faster and more accurate service possible.

Wired Wireless. Ruhmer High-Frequency Apparatus for Multiple Telephony on Lines in the State Post Office Museum, Berlin (Die Ruhmerschen Hochfrequenzapparate für Mehrfachfernsprechen auf Leitungen im Reichspostmuseum in Berlin), R. Fiedler. Archiv für Post u. Telegraphie, no. 3, Sept. 1924, pp. 123-128, 6 figs. Detailed description of original wired wireless plant for multiple speaking shown at Brussels exposition, 1909, now on exhibition in Berlin.

Wired-Wireless Telegraphy and Telephony (Drahtfunk), H. Schulz and K. W. Wagner. Elektrotechnische Zeit., vol. 45, no. 20, May 15, 1924, pp. 485-489, 5 figs.; also in special radio number of same journal, 1924, pp. 40-44, 5 figs. Wired wireless for public service, on high-tension lines, and in lighting system for purposes of entertainment and instruction.

Wireless. See RADIOTELEPHONY.

TELESCOPES

Prism Objectives, Calculation. Calculation of Prism Objectives, with Examples of Their Applications (Berechnung von Prismenobjektiven nebst Beispielen ihrer Anwendungen), H. Cranz. Zeit. für Instrumentenkunde, vol. 44, no. 6, June 1924, pp. 237-260, 4 figs. Investigation was prompted by increasing employment of total reflecting prisms in telescopes for purpose of reducing their length through zig-zag path of light in prism and for complete and efficient reversal of image; two fitting spherical surfaces act as one when suitable refracting cement is used, and this method is now adopted for combining prism and objective. Paper is mathematical throughout.

Reflecting. A New 60-In. Telescope for Perkins Observatory, Ohio Wesleyan University. Mech. Eng., vol. 46, no. 3, Mar. 1924, pp. 113-117 and 147, 8 figs. Describes reflecting telescope built by Warner & Swasey Co., Cleveland, and gives details of tube, polar axis, declination axis, driving clock, and electric control.

Reflecting Telescope for Simeis Observatory, Crimea. Nature (Lond.), vol. 113, no. 2841, Apr. 12, 1924, pp. 551-552, 1 fig. 40-in. reflecting telescope made by Sir Howard Grubb & Sons for Russian Government.

TELESTEREOGRAPHY

[See also TELEVISION.]

Electrical Transmission of Pictures. Electrical Transmission of Pictures. Elec. World, vol. 83, no. 24, June 14, 1924, pp. 1223-1224, 5 figs. Combination of high-frequency carrier current, vacuum-tube modulation, telegraphic synchronizing equipment, light-controlled electron stream and newly developed "light" cell makes possible electrical transmission of photographs.

Radio. See PHOTOGRAPHY, Radio Transmission of Photographs.

TELETYPE. See TELEGRAPHY, Printing System.

TELEVISION

Experiments. An Account of Some Experiments in Television, J. L. Baird. Wireless Wld., vol. 14, no. 6, May 7, 1924, pp. 153-155, 3 figs. Description of author's early experiments and apparatus which was one of the first constructed and capable of transmitting only crude outline images.

Mihaly's Telehor. Electric Television and the Telehor (Das elektrische Fernsehen und das Telehor), D. von Mihaly. Elektrotechnischer Anzeiger, vol. 41, nos. 141, 142-143, and 144, Sept. 2, 4, and 6, 1924, pp. 763-764, 769-770, and 777-778, 8 figs. Detailed criticism of Mihaly television process and apparatus, showing that much work remains to be done.

Television, N. Langer. Wireless Wld., vol. 13, nos. 25 and 26, Mar. 19 and 26, 1924, pp. 760-764 and 794-796, 9 figs. Account of work of D. Mihaly.

Swinton System. Television. Engineer, vol. 137, no. 3563, Apr. 11, 1924, pp. 385-386, 3 figs. System developed by Campbell Swinton and described by him in lecture before Radio Soc. of Great Britain.

Voss System. The Problem of Electric Seeing at a Disance (Das Problem des elektrischen Fernsehens), A. Voss. Elektrotechnischer Anzeiger, vol. 41, nos. 104, 105, 106-107, and 108, June 28, July 1, 3, and 5, 1924, pp. 537-538, 545-546, 553-554, and 561-564, 25 figs. Discusses selenium cells and their properties, behavior of selenium at different temperatures, conducting and non-conducting modification of selenium. July 1: Inertia of selenium and how to reduce it. July 5: Details of proposed television apparatus.

See also TELESTEREOGRAPHY.

TELLURIDES

Canada. The Tellurides, E. Thomson. Can. Min. Jl., vol. 45, no. 49, Dec. 5, 1924, pp. 1187-1190, 4 figs. Their characteristics and their occurrences in Canada.

TELPHERS. See CONVEYORS, Overhead.

TEMPERATURE CONTROL

Automatic Apparatus. Automatic Temperature-Control Apparatus. Engineering, vol. 118, no. 3070, Oct. 31, 1924, pp. 628-629, 5 figs. Apparatus for automatically controlling temperature of gas-fired annealing or hardening furnace, exhibited at Empire Exhibition.

"Samson" Automatic Temperature Regulators. Power Engr., vol. 19, no. 216, Mar. 1924, pp. 105-106, 3 figs. Device for maintaining constant temperature of atmosphere or of liquids heated by air, hot water, or steam.

Temperature-Controlling Device of Rugged Design. Chem. & Met. Eng., vol. 30, no. 1, Jan. 7, 1924, pp. 21-22, 2 figs. Controller placed on market by Files Temperature Control Co., Bridgeport, Conn., operates without such auxiliary elements as compressed air or volatile liquids.

Methods. Accurate Temperature Control System, S. R. Winters. Ice & Refrigeration, vol. 67, no. 1, July 1924, pp. 10-13, 4 figs. Methods employed at Bur. of Animal Industry, U. S. Dept. Agriculture, for maintaining temperatures with accuracy of 0.1 deg. cent.; refrigerating equipment and control system.

The Fixed Orifice Method of Temperature Control. Heat. & Vent. Mag., vol. 21, no. 7, July 1924, pp. 55-57, 3 figs. Tests showing practicability of arrangement as used with variable pressures of either water or steam.

Photographic Recorders. A Photographic Recorder for Temperature and Other Physical Quantities, W. H. Stannard and P. E. Klopsteg. Optical Soc. Am.—Jl., vol. 9, no. 5, Nov. 1924, pp. 587-598, 5 figs Describes instrument developed for purpose of obtaining data on a number of variables simultaneously over long periods of time much more completely and accurately than is possible by personal observation. Can be used in study of any problem in which it is possible to obtain galvanometer deflections as known functions of variables in question, as well as for study of temperature control.

Thermostatic. See THERMOSTATS.

TEMPERATURE MEASUREMENT

[See also PYROMETERS; THERMOMETERS.]

Air. Measuring Air Temperatures in Closed Spaces with Thermometers not Protected From Radiation (Die Messung von Lufttemperaturen in geschlossenen Räumen mit nicht strahlungsgeschützten Thermometern), H. Hausen. Zeit. für Technische Physik, vol. 5, no. 5, 1924, pp. 169-186, 19 figs. Discusses errors in measuring due to temperature measuring instruments constantly receiving and delivering heat by radiation to surrounding bodies, and develops formulas for calculation error Δt of measurement due to radiation.

Instruments. Electric Multiple Measuring and Recording Apparatus for Thermal Measurement (Elektrische Vielfach-Fernmess- und Schreibgeräte für die Wärmewirtschaft), J. Cartus. Archiv für Wärmewirtschaft, vol. 5, no. 9, Sept. 1924, pp. 174-176, 12 figs. Discusses measuring devices for pressure, draft, temperature, quantities of gas, etc.; connection of several of same indicator or recording apparatus.

Electric Temperature Indicators, I. M. Stein. Power Plant Eng., vol. 28, no. 21, Nov. 1, 1924, pp. 1103-1105, 7 figs. Principles of potentiometer and resistance types of measuring equipment.

Electric Temperature Measuring Methods (Elektrische Temperaturmessmethoden), O. Feussner. Elektro-Journal, vol. 4, no. 10, Oct. 1924, pp. 275-278, 3 figs. Discusses resistance thermometers, thermo-electric and radiation measuring instruments, their field of application, advantages and disadvantages.

Operation of Electrical Temperature Indicators and Recorders, E. H. Stivender. Power, vol. 60, no. 27, Dec. 30, 1924, pp. 1051-1053, 7 figs. Operation of various methods devised and used commercially for electrically measuring temperatures.

Pyrometers. See PYROMETERS.

Temperature Scales and Heat Unit. Temperature Scales in Theory and Practice (Die Temperaturskala in Theorie und Praxis), F. Henning. Zeit. für Instrumentenkunde, vol. 44, no. 8, Aug. 1924, pp. 349-366, 1 fig. Theoretic basis of temperature scales. Practical temperature scales and their fixed points derived from H, O, N, CO_2, Hg, S, Au, etc., for temperatures up to 1100 deg.

The German Code for Temperature Scale and Heat Unit (Das deutsche Gesetz über die Temperaturskale und die Wärmeeinheit), M. Jakob. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 45, Nov. 8, 1924, pp. 1176-1178. Origin and significance of code developed by Physikalisch-Technische Reichsanstalt for German Government; main points of code; practical fundamentals of temperature scale.

Thermocouples. Temperature Measuring by Means of Thermo Couples (Zur Temperaturmessung mittels Thermoelementen), J. Würschmidt. Zeit. für Metallkunde, vol. 16, no. 7, July 1924, pp. 271-274. Discusses definition of terms, electromotive force and thermoelectric force, average thermo force per degree between 0 deg. and 100 deg. for metals most frequently used.

TEMPLETS

Design. Design of Templets of Precision (Sulla costruzione delle sagome di precisione), S. Donno. Industria, vol. 38, nos. 12 and 15, June 30 and Aug. 15, 1924, pp. 331-336, and 411-414, 41 figs. Discusses classification of templets, determination of tolerances; rectilinear and curvilinear templets, methods of construction.

TEREDOS. See MARINE BORERS.

TERMINALS, FREIGHT. See TERMINALS, RAILWAY.

TERMINALS, LOCOMOTIVE

Design. See RAILWAY SHOPS, Design.

Germany. Locomotive Terminals at Stuttgart and Kornwestheim Switching Yard (Lokomotivheizhäuser Stuttgart-Abstellbahnhof und Kornwestheim-Verschiebebahnhof), K. Schaechterle. Bautechnik, vol. 2, no. 48, Nov. 7, 1924, pp. 543-546, 6 figs. Details of design, construction and equipment; respective capacities 93 and 68 locomotives.

Moncton, N. B. Canadian National Railways Engine Terminal at Moncton, N. B. Ry. Rev., vol. 75, no. 20, Nov. 15, 1924, pp. 785-795, 18 figs. Facilities provided for turning engines and making heavy running repairs.

Peach Creek, W. Va. New Engine Terminal at Peach Creek, W. Va. Ry. Rev., vol. 74, no. 7, Feb. 16, 1924, pp. 279-286, 15 figs. partly on p. 287. Describes engine house, boiler plant and engine room, machine shop, oil room, store department facilities, coaling plant, and water-supply plant and its equipment.

Precast Concrete. See CONCRETE CONSTRUCTION, REINFORCED. Precast.

Richmond, Va. A Notable Engine Terminal, Acca, Virginia. Ry. Rev., vol. 74, no. 10, Mar. 8, 1924, pp. 399-412, 32 figs. partly on p. 413. Complete description of new engine terminal of Richmond, Fredericksburg & Potomac R. R.

Advanced Design in New Engine Terminal. Ry. Age, vol. 76, no. 9, Mar. 1, 1924, pp. 492-499, 17 figs. Layout, outside facilities and buildings of terminal recently completed at Richmond, Va. by R. F. & P.

Schaerbeek, Belgium. The New Engine Shed at Schaerbeek-Formation, J. Van Rijn and A. Chantrell. Int. Ry. Congress Assn.—Bul., vol. 6, no. 12, Dec. 1924, pp. 1091-1121, 16 figs. Describes new enginehouse which Belgian State Rys. Administration opened at Schaerbeek-Formation station, and its installations, including mechanical coaling plant, arrangement for dealing with ashes, Micheli hot water washing-out plant, arrangements for mixing and storage of coal; and plant for dealing with cotton waste used for cleaning engines.

Turntables. See ENGINEHOUSES, Turntables.

Water Supply. Water Supply of the New Genoa-Terralba Enginehouse (Impianti idrici nel nuovo deposito locomotive e locomotori di Genova-Terralba), E. D'Andrea. Rivista Tecnica delle Ferrovie Italiane, vol. 25, no. 3, Mar. 15, 1924, pp. 73-85, 12 figs. partly on supp. plates. Particulars of plant consisting of 7 driven wells, electrically-driven centrifugal pumps, and twin monolithic concrete water tanks each of a capacity of 50,000 gal., and erected over a common pump house.

TERMINALS, MARINE

Drayways and Approaches. Terminal Drayways and Approaches, H. McL. Harding. Ports & Waterways, vol. 1, no. 1, July 1924, pp. 22-24, 1 fig. Notes regarding mechanical facilities, pavements, railway tracks, etc.

Fire Protection. Fire Protection at Marine Terminals, Seattle, G. F. Nicholson. Ports & Waterways, vol. 1, no. 1, July 1924, pp. 21-22, 4 figs. Automatic sprinkler systems, fire alarm systems, fire walls, fire hose, fire extinguishers, Pyrenes, concrete warehouses provided with large roof tank for furnishing secondary source of supply for automatic sprinkler systems and fire hydrants are some features of fire protection for wharves and marine terminals.

Illinois Waterway. Terminals for the Illinois Waterway, R. I. Randolph. Ports & Waterways, vol. 1, no. 1, July 1924, pp. 10-12 and 44, 3 figs. Gives contents of contemplated bill for terminals all along line of waterway.

Origin-Destination Survey. An Origin-Destination Survey of the Port of New Orleans. Ports & Waterways, vol. 1, no. 2, Aug. 1924, pp. 72-78, 10 figs. Discusses traffic growth and future, situation within terminal district, organization of terminal survey and practical results of terminal survey.

Origin-Destination Survey of a Large Port—What Goes on Within the Port-Terminal and the Important Function of the Terminal Railroad System, J. R. Bibbins. Wld. Ports, vol. 12, no. 4, Feb. 1924, pp. 33-53 and (discussion) 53-72, 5 figs. Shows actual distribution of all traffic by rail and water, relatively large volume of intra-terminal movements, best locations for clearing and classification facilities, lines along which improvements and future development may be carried out, real functions and belt-line system, close relation between marine and rail operations and facilities, and emphasizes value of foresight in planning or replanning large port-terminal systems to meet oncoming burden of future growth.

Passenger. Ocean Passenger Terminals, R. S. MacElwee. Ports & Waterways, vol. 1, no. 2, Aug. 1924, pp. 54-61, 11 figs. Discusses fixed level landings, passenger traffic arrangements, floating landing places, accessories, and steerage passenger accommodations.

San Francisco, Cal. China Basin Terminal, C. W. Geiger. Public Wks., vol. 55, no. 1, Jan. 1924, pp. 26-28, 3 figs. Methods used in connection with project of Cal. State Harbor Commission; pre-cast concrete caissons connected by curved curtain walls, foundation excavated by use of dynamite and supported on piles, form combined sea wall and wharf.

Wilmington, Del. Wilmington Completes One Unit of Port Development, Chas. H. Gant. Eng. News-Rec., vol. 92, no. 4, Jan. 24, 1924, pp. 152-154, 1 fig. Modern marine terminal with combined railroad car and truck loading facilities; covered and open storage.

TERMINALS, RAILWAY

Ferry Terminal. New Ferry Terminal Includes Advanced Designs, F. Jasperson. Ry. Age, vol. 76, no. 25, May 24, 1924, pp. 1249-1252, 8 figs. See also Ry. Rev., vol. 74, no. 20, May 17, 1924, pp. 871-876, 11 figs. Reading Co. completes installation at Camden, N. J., to handle heavy seashore traffic.

Freight. Cartage Practice at Intra-Terminal and Off Track Freight Stations, J. F. Murphy. Wld. Ports, vol. 12, no. 9, July 1924, pp. 81-94 and (discussion) 94-120. Cartage of freight at St. Louis where Columbia Terminals Co. has developed by use of tractor and semi-trailer automotive equipment, supplemented by off-track stations, a system of freight handling that has been means of providing adequate freight terminals in that city.

Clifton Forge (Va.) Terminal Involves Heavy Work. Ry. Age, vol. 76, no. 6, Feb. 9, 1924, pp. 365-367, 4 figs. See also Ry. Rev., vol. 74, no. 6, Feb. 9, 1924, pp. 241-248, 16 figs. Progress made in construction of new facilities by Chesapeake & Ohio; involve construction of enlarged and modern freight terminal, including total of 66 mi. of tracks over area of 636 acres.

Indianapolis Has Largest Electric Railway Freight Terminal in World. Elec. Ry. Jl., vol. 64, no. 5, Aug. 2, 1924, pp. 153-156, 8 figs. Four interurban roads entering city have joined in this large terminal development to meet need of expanding freight business; design facilities quick loading and unloading both of cars and vehicles; further extensions are planned.

Layout and Design of Large Modern Freight Terminal. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 227-230, 7 figs. Terminals of Pennsylvania-Detroit Ry. have steel freight-house with tracks on upper deck; team yard at street level, but future elevation planned; outlying gravity yard with "mechanical hump."

Pennsylvania Completes New Freight Station. Ry. Age, vol. 76, no. 18, Apr. 5, 1924, pp. 875-878, 10 figs. Capacious two-level structure latest feature of Pennsylvania's entrance into Detroit; building has concrete roof and expansion joints; 25-ton gantry crane for team tracks.

Some Things Which the Erie Railroad is Doing. Ry. Rev., vol. 75, no. 12, Sept. 20, 1924, pp. 423-430, 14 figs. Discusses freight terminals of Erie Ry. in New York and Chicago districts, with special reference to certain recent extension of its less-than-carload facilities which afford service distinct from that offered by any other railroad. In New York facilities have been augmented by inland freight stations which are operated by trucking service which is also available to shipper as substitute for store-door delivery. In Chicago car-float service on Chicago River operates two freight stations in heart of important industrial districts.

Haulage in. Successful Tractor and Trailer Haulage, J. F. Murphy. Port & Terminal, vol. 4, no. 1, Feb. 1924, pp. 16-19, 6 figs. Intra-

city automotive hauling and intra-terminal haulage; off-track versus on-track railway depots; tractor and semi-trailer movement control.

Passenger. Foundation Tests by Chicago Union Station Company, J. D'Esposito. West. Soc. Engrs.—Jl., vol. 29, no. 2, Feb. 1924, pp. 33-44, 10 figs. Describes tests made on caissons, concrete pier with belled base, and straight concrete pier, in connection with construction of Chicago Union Station.

Progress on the Chicago Union Station. Ry. Rev., vol. 74, no. 10, Mar. 8, 1924, pp. 416-422, 10 figs. Description of important passenger tunnel; will be in service late in 1924 and will be completed in 1925.

Ports. Study of a Large Terminal Develops Basic Data, J. R. Bibbins. Ry. Age, vol. 76, no. 8, Feb. 23, 1924, pp. 463-465, 2 figs. Origin-destination survey made at New Orleans may be applied to other large railway centers.

River-and-Rail Freight. River-and-Rail Freight Terminal at Memphis, Tenn., Geo. W. Foster. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 696-698, 4 figs. Car and truck inclines from concrete wharf boats to buildings on bluff; tractors haul trailer trucks in warehouses.

Smoke-Removal System. Fans to Avoid Smoke Nuisance in Chicago Union Station. Eng. News-Rec., vol. 92, no. 22, May 29, 1924, pp. 929-931, 3 figs. Low-level viaducts crossing trainshed have smoke chambers in floor with exhaust fans discharging into open air.

Train Shed, Cologne, Germany. The Train Shed of the Cologne-Deutz Railway Station (Die Bahnhofshalle von Cöln-Deutz), M. Foerster. Bauingenieur, vol. 5, no. 3, Feb. 15, 1924, pp. 43-55, 26 figs. Three-sectional shed has middle span of 27.50 m. and side spans of 18.72 m. each; whole system is statically determined and consists of three 3-hinged arches.

TESTING MACHINES

Building Materials, Damping Capacity of. See BUILDING MATERIALS, Testing Machine for.

50-Ton. Comparative Tests with 50-Ton Material Testing Machines (Vergleichende Versuche mit 50-t-Baustoffprüfern), H. Hecht. Tonindustrie, vol. 48, no. 24, Mar. 22, 1924, pp. 251-252, 1 fig. Results of comparative tests with other testing machines demonstrate advantages of described machine for testing porcelain insulators and for testing bending strength of cement, concrete, and reinforced-concrete beams.

Hydraulic. Testing Machine for Materials. Eng. Progress, vol. 5, no. 7, July 1924, pp. 131-132, 2 figs. Details of hydraulic testing machine suitable for making all current tests occurring in a works, such as tension, compression, bending, punching, sheaving, ball pressure and ring tests, made by Krause & Co. A.-G., Berlin.

Knife Switches. Testing Machine for Knife Switches (Von der Untersuchungsstelle für Isoliermaterialien), O. Edelmann. Elektrotechnische Zeit., vol. 45, no. 43, Oct. 23, 1924, pp. 1148-1149, 2 figs. Describes ingeniously designed testing machine to determine mechanical qualities of knife switches, eliminating entirely unaccountable variable of human irregularities; consists essentially of two weighted pendulums which are swung out, one at a time, by a motor, and, after having been lifted to adjustable extent, are released.

Metal Strip. Notes on the Testing of Metal Strip, L. Aitchison and L. W. Johnson. Iron & Steel Inst.—Advance paper no. 1, for meeting May 1924, 15 pp., 13 figs. Bend-testing machine; proof stress testing; simple proof stress extensometer. See (abstract) in Iron Trade Rev., vol. 74, no. 21, May 22, 1924, pp. 1361-1364, 5 figs.

Tensile-Strength. Calibration of Tensile Strength Testing Machines by Means of Test Bars (Tarage des machines de traction au moyen d'éprouvettes), M. P. Nicolau. Revue de Métallurgie, vol. 21, no. 6, June 1924, pp. 342-346. Describes new method and shows its advantages compared with older methods.

Inauguration of 100-Ton Tensile Testing Machine at Birmingham. Gas Jl., vol. 165, no. 3173, Mar. 5, 1924, pp. 563-565, 2 figs. Machine is of vertical single-lever type, operated by four straining screws driven through suitable reduction gearing by 15-hp. 440-volt motor; installed at Research Laboratories of Birmingham Gas Dept.

Wood. See WOOD, Testing Machines.

TESTS AND TESTING

Magnetic. The Value of Commercial Magnetic Testing, T. Spooner. Elec. Jl., vol. 21, no. 8, Aug. 1924, pp. 374-377, 3 figs. Discusses methods of magnetic testing of electric sheet metal material including methods of Epstein; magnetic test to indicate faulty annealing, etc.

Shop Methods. Test Methods for the Shop, D. A. Hampson. Am. Mach., vol. 60, no. 9, Feb. 28, 1924, pp. 325-328, 7 figs. Usual shop tests; use of revolution counter, spring balance, platform scale, and Bourdon gage; checking instruments.

Test Bars. New Forms of Test Bars for Tensile Strength Test and Holding Devices (Neue Zugprobestabformen und Einspannvorrichtungen), F. Rinagl. Maschinenbau, vol. 3, no. 21, Aug. 14, 1924, pp. 770-773, 4 figs. Discusses defects of present production of test bars and holding devices and describes improvements for short bars, new bar forms for brittle and elastic material, comparative cost of production.

TETRAETHYL LEAD. See INTERNAL-COMBUSTION ENGINES, Fuels.

TETRALIN. See AUTOMOBILE FUELS, Tetralin.

TETRYL

Specific Heat. See EXPLOSIVES, Specific Heats.

TEXTILE INDUSTRY

British. Empire Textile Conference. Textile Inst.—Jl., vol. 15, nos. 6, 7, 8, and 9, June, July, Aug., and Sept. 1924 (Proc. Sec.). Papers read at conference, held June 10-12, 1924, at British Empire Exhibition, Wembley, Lond., and account of discussions. June: Wool Supplies and Consumption, Requirements of a British Empire Industry, pp. 152-169; Part Played by Our Empire in Production of Raw Cotton, W. H. Himbury, pp. 170-181; Present Position of Textile Industries in India and Trade With Britain, K. S. Rao, pp. 182-189. July: Research in Relation to Cotton Industry, A. W. Crossley, pp. 209-213; Research in Relation to Woollen and Worsted Industries; H. J. W. Bliss, pp. 214-218; Research in Relation to Linen Industry, J. V. Eyre, pp. 219-223; "Futures" Contract, A. B. Muir, pp. 226-234; Export Trade and Employment in Woollen and Worsted Industry, A. N. Shimmin, pp. 235-249, 3 figs. Aug.: Manufacture of Textile Fabrics—Fibres to Yarns, A. B. Shearer, pp. 287-291; Manufacture of Textile Fabrics—Yarns to Fabrics, J. Crompton, pp. 291-321, 40 figs.; British Empire as a Producer of Flax and Hemp Group of Fibres, A. Wigglesworth, pp. 321-332; Flax and Its Products, F. Bradbury, pp. 333-347; Some Aspects of Linen Weaving, Ancient and Modern, F. Anderson, pp. 348-374, 13 figs; Silk Production in Empire, H. M. Lefroy, pp. 374-391; British Silk Trade

and Its Possibilities, P. M. Elton, pp. 391-404. Sept.: Processes in Spinning of Worsted Yarns, J. H. C. Hodgson, pp. 429-438; Machine-Made Lace Industry With Particular Reference to Empire Trade, J. L. Litchfield, pp. 438-443; Retail Distribution of Textiles, S. M. Skinner, pp. 444-452; Textile Export Trade, With Special Reference to Countries Within Empire, E. F. Hitchcock, pp. 453-483.

France. Progress Made Since the War in French Textile Manufacture (Les progrès effectués depuis la guerre dans la construction textile française), A. Renouard. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 136, no. 5, May 1924, pp. 426, 494, 41 figs. Discusses wool, combing, carding, spinning and other processes and products and machinery used; similarly cotton, hemp, silk, and the advance especially in textile machinery.

TEXTILE MACHINERY

British Empire Exhibition. The Machinery of the Cotton Mill at the British Empire Exhibition. Engineering, vol. 118, nos. 3053, 3055, and 3060, July 4, 18 and Aug. 22, 1924, pp. 11-13, 89-91, and 247-251, 34 figs. partly on supp. plates. See also Engineer, vol. 138, no. 3582, Aug. 22, 1924, pp. 202-207, 28 figs. partly on pp. 208 and 212. Descriptions of textile machinery exhibited, including gins, bale breakers and openers, feeding machines, carding engines, drawing frames, spinning machines, weaving machines, folding and measuring machines, etc.

Calico Printing Machine Drive. See ELECTRIC MOTORS, A. C., Variable-Speed.

Gas-Fired Hot-Air Furnace for. Hot-Air Furnaces with Gas Firing (Heissluftofen mit Gasfeuerung), Riemer. Gas- u. Wasserfach, vol. 67, no. 14, Apr. 5, 1924, pp. 182-184, 3 figs. Describes gas-fired hot-air furnace for heating of textile machines; results of preliminary tests; economy and efficiency.

Looms. Textile Machinery. Engineering, vol. 117, no. 3043, Apr. 24, 1924, pp. 549-550, 4 figs. Describes exhibits of Rob. Hall & Sons at Brit. Empire Exhibition, including automatic loom, belt loom for production of cotton, camel hair or hemp driving belts, loom for making horse-hair cloth, and cloth-folding and measuring machine.

Spinning Frames. The Development of the Spinning Frame, Rob. E. Naumburg. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 825-840, 51 figs. Information based upon facts taken largely from Patent Office records; chronological record of development of spinning frame from earliest periods of history to present; future possibilities.

Spinning Machines. New Krupp Spinning Machines (Neue Spinnereimaschinen der Fried. Krupp Aktiengesellschaft, Essen), J. Bogel. Kruppsche Monatshefte, vol. 5, Oct. 1924, pp. 214-220, 13 figs. Details of new spinning machines, needle stick and porcupine, for production of combed wool yarn.

TEXTILE MILLS

Cotton Mills. See COTTON MILLS.

Drying Apparatus. Drying in the Textile Industry (Trocknung in der Textilindustrie), Eickhoff. Sparwirtschaft, nos. 17-18 and 19-20, Sept. and Oct. 1924, pp. 80-85 and 89-92 (GW), 6 figs. Discusses economies of drying process and possibilities of improvements. Describes drying apparatus used in textile mills.

Electric Drive. Electricity in Textile Mills. Electrician, vol. 92, no. 2389, Feb. 29, 1924, pp. 252-260, 17 figs. Six articles, discussing advantages of electric drive for textile mills, use of electricity for driving flax spinning mills, selecting motors for cotton mills, replacing steam with electric drive without cessation of production in carpet mill, special points in converting equipment to electric drive in fabric printing works, and a Swiss spinning mill fitted with Oerlikon drives.

Individual Drive of Ring Spinning Frames in Wool Mills, J. Elmer. Brown Boveri Rev., vol. 11, no. 6, June 1924, pp. 107-109, 4 figs. Use of commutator motors, 3-phase or single-phase, adaptable to any 3-phase low voltage supply, and their advantages for individual drive of ring spinning frames.

Engineering Principles Applied to. The Engineer's Field in Industrial Economics, E. Szepesi. Mech. Eng., vol. 46, no. 11a, mid-Nov. issue, 1924, pp. 841-848, 12 figs. Illustrations of practical applications of engineering principles to economic problems in textile industry.

Humidity Control. Electric Distance-Humidity Control in Textile Mills (Elektrische Fern-Feuchtigkeitsmessung in den Betrieben der Textilindustrie), H. Bongards. Zeit. für Fernmeldetechnik, vol. 5, no. 9, Sept. 16, 1924, pp. 83-84. Determination of water vapor content of a gas, on basis of temperature difference between a dry and a wet thermometer (psychrometer), or on basis of effect of air moisture on some organic substance, such as a hair (hair hygrometer).

Lighting. Some Notes on Gas Lighting in the Textile Industry, E. L. Oughton. Illuminating Engr., vol. 17, no. 5, May 1924, pp. 66-75 and (discussion) 75-78, 9 figs. Describes typical systems of modern gas lighting and explains how varied requirements of different textile processes could best be met.

See also LIGHTING, Textile Mills.

Management in. See INDUSTRIAL MANAGEMENT, Textile Mills.

Mechanical Department. The Textile Mill Mechanical Department. Textile Wld., vol. 66, no. 5, Aug. 2, 1924, pp. 79-85, 2 figs. Relation to wet finishing, dyeing, and dry finishing departments; power transmission system; care of motors and shafting; preventing oil and rust stains; keeping down depreciation on idle machinery; washing machine and fulling mill rolls; temperature control.

Power Plant. See STEAM POWER PLANTS, Textile Mills.

Process Steam. See STEAM POWER PLANTS, Process Steam.

Temperature Control. Central Temperature Control at Hamilton Co., E. D. Fowle. Textile Wld., vol. 66, no. 22, Nov. 29, 1924, pp. 39 and 41, 2 figs. How a system of centralized automatic temperature control has been tried out in dyehouse of Hamilton Woolen Co., Southbridge, Mass., and proved successful; steam saving.

Woolen Mills. Organization and Construction of Woolen Mills, A. W. Benoit. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 208-210 and (discussion) 210-211, 4 figs. Ideal woolen-mill location allows for expansion, has good railroad facilities, ample soft-water supply and near-by mill help; type of building; arrangement of departments; steam, hot water, and power problems.

TEXTILES

Bleaching. See BLEACHING.

Cotton. See COTTON.

Dyeing. See DYE INDUSTRY; DYEING; DYES.

Fabrics. See FABRICS.

Fibers, Elasticity of. An Investigation of the Nature of the Elasticity of Fibres, S. A. Shorter. Textile Inst.—Jl., vol. 15, no. 4, Apr. 1924, pp.

T207-T229, 14 figs. Experimental investigation of fiber elasticity. Formulates theory of fiber elasticity, basis of which is a dynamical model, which imitates behavior of a fiber. Properties of actual fibers studied in light of this theory. Relation between behavior of fibers and that of yarns. Possible future development of work.

Jute. See JUTE.

Mule Yarns. The Effect of Roller Delivery Motion on the Regularity of Mule Yarns, F. Charnley. Textile Inst.—Jl., vol. 15, no. 5, May 1924, pp. T273-T280, 3 figs. Results of investigation; twist, breaking-load, and photographic tests.

Silk. See SILK.

Water Absorption. The Thermodynamics of Water Absorption by Textile Materials, S. A. Shorter. Textile Inst.—Jl., vol. 15, no. 6, June 1924, pp. T328-T336, 3 figs. Discusses evolution of heat by absorption of water in liquid form by textile materials and criticises some papers on subject.

Wool. See WOOL.

Yarns. Wearing Tests for Yarns and Some Observations on Reeds, G. F. New. Textile Inst.—Jl., vol. 15, no. 4, Apr. 1924, pp. T230-T236, 13 figs. Instruments developed with which to obtain, both easily and quickly, knowledge of probable behavior of any particular yarn or dressing under working conditions.

THALLIUM

Structure. See LEAD, Structure.

THEATERS

Air Conditioning in. See AIR CONDITIONING, Theaters.

Fire Protection. Safety Devices at the Wiesbaden Theaters (Die Sicherheitseinrichtungen der Wiesbadener Theater), D. Berlit. Siemens-Zeit., vol. 4, no. 10, Oct. 1924, pp. 358-361, 3 figs. Details of new Siemens & Halske automatic system comprising 300 automatic alarms and 40 press-buttons, also automatic sprinklers for metal safety curtains.

Heating and Ventilating. See HEATING AND VENTILATION, Theaters.

Seating Area, Design of. See GRANDSTANDS, Seating Area, Design of.

THEODOLITES. See SURVEYING, Theodolites.

THERMIONIC EMISSION. See ELECTRIC CONDUCTORS, Free Electron Concentration within.

THERMIONIC VALVES. See VACUUM TUBES, Thermionic Valves; RECTIFIERS, Thermionic-Valve.

THERMIONICS

Theory. The Theory of Thermionics, H. A. Wilson. Physical Rev., vol. 24, no. 1, July 1924, pp. 38-48. Discusses thermodynamic theory of electron emission from metals at high temperature.

THERMIT

Bearing Metal. See BEARING METALS, Thermit.

Foundry Uses. See IRON FOUNDING, Thermit, Application of.

THERMIT WELDING

Rails. See RAILS, Welding.

THERMOCOUPLES

Base-Metal, Materials for. Characteristics of Some Materials for Base-Metal Thermocouples, F. E. Bash. Am. Soc. for Testing Matls.—Preprint of paper for meeting June 24-27, 1924, no. 19n, 7 pp., 1 fig. See also Forging-Stamping-Heat Treating, vol. 10, no. 8, Aug. 1924, pp. 307-309, 1 fig. Important considerations in choosing elements of thermocouples, and results of tests in which thermoelectric properties of a number of alloys are determined against copper used as a standard material.

Lagless. Use of Thermoelectric Couples (Ueber den Gebrauch von Thermoelementen), W. Redenbacher. Archiv für Wärmewirtschaft, vol. 5, no. 11, Nov. 1924, pp. 209-211, 2 figs. Discusses lagging behind of thermocouples in indicating temperature, and describes a new thermocouple, using copper and constantan wire, which eliminates lag, and its application in measuring flue-gas temperature.

THERMODYNAMICS

Diagrams, Application of. The Change of Curves of State Between Any Given Limit Curves and Applications to Water, Carbonic Acid and Air (Ueber die Veränderung von Zustandskurven zwischen beliebigen Grenzkurven nebst Anwendungen auf Wasser, Kohlensäure und Luft), V. Fischer. Zeit. für technische Physik, vol. 5, nos. 1, 2, and 3, 1924, pp. 17-21, 39-44, and 83-88, 10 figs. The c_p and T diagrams are used for establishing general thermodynamic relations and numerous applications of these are shown; new diagram of specific heat is also drawn upon.

Entropy. See ENTROPY.

Nernst Theorem. The Nernst Heat Theorem (Zur Prüfung des Nernstschen Wärmetheorems), W. H. van de Sande Bakhuyzen. Zeit. für physikalische Chemie, vol. 111, no. 1-2, July 15, 1924, pp. 39-56, 2 figs. In all instances of investigation discrepancies between measured values of decrease of thermodynamic potential and those calculated on basis of Nernst theorem are of no greater magnitude than would result from inaccuracy of data employed.

Refrigerating Fluids. See REFRIGERANTS, Thermodynamics of.

Third Law. A Statement of the Third Law of Thermodynamics, E. D. Eastman. Am. Chem. Soc.—Jl., vol. 46, no. 1, Jan. 1924, pp. 39-43. Argument is made that there is in ideal case no sharp dividing line between crystalline and (supercooled) liquid states; statement of third law is proposed which is in harmony with ideas expressed.

Water-Vapor Diagram. Straight-Line Water-Vapor Diagram for the Standard and High-Pressure Ranges (Geradliniges Wasserdampf-Diagramm für Normal- und Hochdruckgebiet, M. Seiliger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 2, Jan. 12, 1924, pp. 25-27, 2 figs. See also (translation in abstract) Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 212-213, 1 fig. Based on the Callendar-Mollier formulas for water vapor, author develops a new diagram, and claims to show that nearly all changes of state of water vapor can be expressed by straight lines.

THERMOMETERS

[See also TEMPERATURE MEASUREMENT, Instruments.]

Distance. Mechanically-Operated Distance Thermometers. Power Engr., vol. 19, no. 214, Jan. 1924, p. 12, 4 figs. Application of well-known principle by which depth of liquid in tank can be measured pneumatically has been applied to distance thermometry by Fox Instrument Co.

Katathermometers. The Kata Thermometer—Its Value and Defects, W. J. McConnell and C. P. Yaglaglou. U. S. Bur. Mines—Reports of Investigations, no. 2565, Jan. 1924, 12 pp., 3 figs. on supp. plates. Its history and development;

description of instrument proper; fundamentals; its practical use as an anemometer and as an index to human comfort; other types of similar instruments. Bibliography of katathermometer.

Value of the Kata Thermometer in Effective Temperature Studies, M. Ingels. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 6, June 1924, pp. 453-456, 1 fig Deals with work of adopting this instrument for measuring effective temperatures.

Platinum-Resistance. Formulation of a Temperature Scale Between 0 and —193 deg. by Means of a Platinum Resistance Thermometer (Darstellung der Temperaturskale zwischen 0 und —193 deg. durch das Platinwiderstandsthermometer), F. Henning and W. Heuse. Zeit. für Psysik, vol. 23, no. 1-2, Apr. 12, 1924, pp. 95-104. Describes platinum resistance thermometer calibrated to melting point of ice and normal boiling points of oxygen and CO_2 and gives table for interpolations.

THERMOS BOTTLES

Efficiency of. See GLASS MANUFACTURE, Thermos Bottles.

THERMOSTATS

Automobile. Value of the Thermostat, W. G. Aston. Autocar, vol. 53, no. 1499, July 11, 1924, pp. 50-51, 4 figs. Permits engine to attain and maintain effective working temperature and guarantees freedom from boiling under strenuous working.

Bimetallic Disk-Type. The Bimetallic Disc Type Thermostat, V. C. Vaughan. Elec. Jl., vol. 21, no. 11, Nov 1924, pp. 532-534, 5 figs. Thermal characteristics; construction and operation.

Electric-Furnace. Thermostats for Very High Temperatures, L. H. Adams. Optical Soc. Am.—Jl., vol. 9, no. 5, Nov. 1924, pp. 599-603, 2 figs. Describes what is without question best method for automatic regulation of electric furnaces at high temperatures.

Types. Modern Thermostats and Their Range of Application (Neuartige Thermostaten und ihr Anwendungsgebiet), B. Klaften. Gesundheits-Ingenieur, vol. 47, no. 34, Aug. 23, 1924, pp. 370-373, 8 figs. Describes apparatus depending on expansion of metals instead of liquids and explains their action and regulation.

THRESHING MACHINES. See FARM MACHINERY, Threshing Machines.

TIDAL POWER

Hydrocompressor Installations. Tidal Power Installations, J. O. Boving. Elec. Rev., vol. 95, no. 2454, Dec. 5, 1924, pp. 844-845, 1 fig. Discusses advantages of hydrocompressors and possibilities of development of low-head hydrocompressor.

Tidal Power Installations, A. J. V. Underwood. Elec. Rev., vol. 95, no. 2451, Nov. 14, 1924, pp. 725-727, 1 fig. Discusses method of utilizing energy of tides by use of hydraulic compressors, and compares this system with water-turbine system.

Utilization. Utilization of Tidal Power at the Aber Vrac'h Plants (L'utilisation des marées aux installations de l'Aber Vrac'h), G. Trautner. Technique Moderne, vol. 16, no. 22, Nov. 15, 1924, pp. 782-785, 7 figs. Discusses various methods proposed for utilizing tidal power in view of fact that French government has voted to participate in Aber Vrac'h undertaking to solve practicability of question. Bibliography.

TIDES

Calculation. German Tides Calculating Machine (Die deutsche Gezeitenrechenmaschine), H. Rauschelbach. Zeit. für Instrumentenkunde, vol. 44, no. 7, July 1924, pp. 285-303, 4 figs. Detailed description of new machine built in 1915-1916 for observatory at Wilhelmshaven for manual or electric operation.

Investigation of Currents and. The Tidal and Current Work of the Coast and Geodetic Survey, G. T. Rude. Franklin Inst.—Jl., vol. 197, nos. 1 and 2, Jan. and Feb. 1924, pp. 73-97 and 217-251, 25 figs. Brief, non-mathematical explanation of tides and currents from engineering, or rather, physical viewpoint; outline of activities of Coast and Geodetic Survey in tidal and current work, with reference to recent investigations in subject of wind-driven currents; relation and importance of tides and currents to work of engineer, mariner, and scientist, and description of instruments and methods employed in observation and prediction of tides and currents.

Measurements. Measurement of Tides at New York, J. M. Buckley. Military Engr., vol. 16, no. 90, Nov.-Dec. 1924, pp. 511-514, 2 figs. Special features of New York harbor tides; methods of tidal observations; cost of work; applicability to other ports.

Power from. See TIDAL POWER.

Secondary Undulations of. On Secondary Undulations of Tides, S. Yamaguti. Japanese Jl. Astronomy & Geophysics, vol. 2, no. 2, 1924, pp. 115-131, 12 figs. Results of investigation made with intention of studying variation of period of undulation caused by change of depth due to tides, and to find some relation between frequency of occurrence of indulations and depth of water. Influence of winds and position of center of cyclone upon excitement of undulation.

TILE

Concrete Roofing. Concrete Roofing Tile Successful in Chicago. Cement & Eng. News, vol. 36, no. 8, Aug. 1924, pp. 35-36 and 44, 3 figs. Describes tile machine, type and color and method of laying tile as made by Hawthorne Roofing Tile Co., Chicago, Ill.

Drain. Curing Conditions of Concrete Drain Tile, Dalton G. Miller.. Concrete, vol. 24, no. 6, June 1924, pp. 235-238, 11 figs. Factor of resistance to sulphate waters.

Glazed, Manufacture. The Manufacture of Glazed Tiles, A. Simon. Eng. Progress, vol. 5, no. 10, Oct. 1924, pp. 214-219, 11 figs. Manufacturing process in modern tile factory; crushers; mass mill; further treatment; glazing; treatment of fireclay mass for capsules.

Hollow Building Tile. See BUILDING MATERIALS, Hollow Tile.

TIMBER

Creosoted. Creosoted Timber in Southern Highway Improvements, P. R. Hicks. Mfrs. Rec., vol. 85, no. 2, Jan. 10, 1924, pp. 78-80, 4 figs. Progress in 1923; problems to be considered; advantages of creosoted-timber structures; life and strength of creosoted timber

The Fire Hazard of Treated Timber, C. S. Heritage. Railroad Herald, vol. 28, no. 12, Nov. 1924, pp. 19-21. Discusses fire hazards of creosoted timber.

Estimation. The Partial Count Method of Timber Estimating, H. R. Wickenden. Jl. of Forestry, vol. 22, no. 5, May 1924, pp. 518-524, 6 figs. Discusses principles and procedure, advantages of partial count method, which may also be used for scaling logs and for determining true cubic volume of logs.

North America, Supply. See FORESTRY, North America.

Preservation. See WOOD PRESERVATION.

Softwood, United States. Our Softwood Timber, W. B. Greeley. Military Engr., vol. 16, no. 86, Mar.-Apr. 1924, pp. 89-94, 9 figs. Extent of softwood forests in the United States; consumption of softwood timber; paper-making woods; exports and imports of softwoods.

Southern United States Resources. Southern Timber Resources in Relation to Paper Making, A. Carey. Paper Trade Jl., vol. 78, no. 19, May 8, 1924, pp. 57-60, 7 figs. Notes on vast area of pine land in southern section of United States, and account of its resident resources and growing power; production of wood by design.

Treatment. See also FORESTRY, India.

TIME STUDY

Bicycle Assembling. Time Study and Belt Conveying (Zeitstudien und Bandarbeit), E. Sachsenberg. Maschinenbau, vol. 3, no. 13, Apr. 10, 1924, pp. 433-439, 22 figs. Discusses connection between time study and synchronized conveying and gives example of assembling bicycles in 118 operations with aid of belt conveyor.

Compiled Form of. Making and Using Time Studies, H. K. Reed. Indus. Mgmt. (N. Y.), vol. 68, no. 1, July 1924, pp. 29-34, 5 figs. Deals with compiled form of time study.

Forge Shops. Determination of Working Time for Forge Shops (Arbeitszeitbestimmung in der mittleren Freiformschmiede), M. Zscheile. Werkstattstechnik, vol. 18, no. 21, Nov. 1, 1924, pp. 597-614, 29 figs. Discusses application of time study to forge-shop practice on lines of its application to machine tools, and develops formulas and graphs.

Foundries. Uniform Piece Work Rates in the Foundry (Wie kommen wir zu einer einheitlichen Akkordbestimmung in der Giesserei?), H. Resow. Stahl u. Eisen, vol. 44, no. 44, Oct. 30, 1924, pp. 1363-1370, 1 fig. Discusses analysis of detailed foundry jobs and gives detailed list of processes with time added to each item, also time-study cards.

Function of. Making and Using Time Studies, H. K. Reed. Indus. Mgmt. (N. Y.), vol. 67, nos. 3, 4, 5, and 6, Mar., Apr., May, and June, 1924, pp. 145-149, 231-234, 272-278, and 375-382, 12 figs. Mar.: Formulation of policy. Apr. and May: Planning time-study installation. June: Production time-study installation.

Mining. Interpreting Time-Study Data of Mining Operations, W. F. Dietrich. Eng. & Min. Jl.-Press, vol. 118, no. 8, Aug. 23, 1924, pp. 297-300, 4 figs. Necessary preliminary to establishment of scientific method of paying by bonus or piece work.

Motion-Picture Films and. See MOTION PICTURES, Films.

Rolling Mills. See ROLLING MILLS, Power Consumption.

Time-Motion Charts. Some Studies of Handling Time, A. Whitehead. Machy. (Lond.), vol. 25, no. 636, Dec. 4, 1924, pp. 289-294, 10 figs. Time-motion charts applied to analysis of tooling and assembly operations.

Usefulness of. Making and Using Time Studies, H. K. Reed. Indus. Mgmt. (N. Y.), vol. 68, no. 3, Sept. 1924, pp. 165-169, 2 figs. Problems of "maintenance" of time study, discussing those factors which, in final analysis, determine degree of concrete usefulness of time study in modern management.

TIN

Deposits. See TIN DEPOSITS.

Electrolytic Refining. Addition Agents in Tin Refining Electrolytes, E. F. Kern and E. A. Capillon. Am. Electrochem. Soc.—Advance paper no. 27, for meeting Apr. 24-26, 1924, pp. 353-369, 1 fig. Investigation of effect of various addition agents on cathode deposit of tin; major portion of tests was confined to acid tin sulphate and acid tin-sodium sulphate electrolytes.

Electrolytic Refining of Tin, J. R. Stack. Am. Electrochem. Soc.—Advance paper no. 20, for meeting Apr. 24-26, 1924, pp. 279-287, 2 figs. Only commercial electrolytic tin refinery is located at Perth Amboy plant of Am. Smelting & Refining Co.; to date, only practical solution of problem of separating from tin impurities such as antimony, arsenic, lead, and bismuth lies in electrolysis; discusses various electrolytes tried out commercially; treatment of anode slimes.

Electrolytic Tin, Chas. L. Mantell. Am. Electrochem. Soc.—Advance paper no. 19, for meeting Apr. 24-26, 1924, pp. 269-278. Discusses various electrolytic baths for refining tin, from viewpoint of their application on commercial scale, giving advantages, disadvantages and special applications.

Mines. See TIN MINES.

Passivity. See METALS, Passivity.

Production, 1923. Tin in 1923, B. L. Johnson. U. S. Geol. Survey (Mineral Resources of U. S.), no. I:7, Sept. 26, 1924, pp. 101-103. Production and development; melting industry; imports and exports; consumption; prices.

Reduction and Refining, U. S. The Reduction and Refining of Tin in the United States, H. H. Alexander and J. R. Stack. Am. Inst. Min. & Met. Engrs.—Trans., no. 1331-M, Mar. 1924, 37 pp., 5 figs First attempts at smelting; Bolivian-tin concentrates; assays and analysis; practical tests for tin; processes and purification; smelting process; cleaning slags and alloy treatment; by-products; American modifications in tin smelting; roasting and sintering; blast furnaces; partial, or selective, reduction process. Blast furnace vs. reverberatory; electrolytic refining; production statistics; status of industry in America.

TIN ALLOYS

Copper-Tin. See COPPER ALLOYS, Copper-Tin.

Heat of Formation. Heat of Formation of Inter-metallic Compounds. Tin Alloys. (Ueber die Bildungswärmen intermetallischer Verbindungen. Zinnlegierungen.), W. Biltz and W. Holverscheit. Zeit. für anorganische u. allgemeine Chemie, vol. 140, no. 3, Nov. 3, 1924, pp. 261-276, 2 figs. Particulars of experiments with $CaSn_3$, Mg_2Sn, $NaSn_2$, NaSn, and other compounds; their heats of solution and formation.

TIN DEPOSITS

Bolivia. The Tin Deposits of Chacaltaya, Bolivia, W. Lindgren. Economic Geology, vol. 19, no. 3, Apr.-May 1924, pp. 223-228. Geology, and description of ore.

Perak, Malay States. The Deep Leads of Kinta Valley, W. E. Cameron. Min. Mag., vol. 31, no. 5, Nov. 1924, pp. 276-285, 2 figs. Discusses theories relating to occurrence of alluvial tin deposits of varying geological age in Kinta Valley, Perak, and gives author's own explanation of facts as at present known.

Rocky Creek, Australia. Rocky Creek Syndicate's Prospecting Areas, Rocky Creek, C. C. Morton. Queensland Govt. Min. Jl., vol. 25, no. 292, Sept. 1924, pp. 325-329, 1 fig. History and geology; nature of tin occurrence; nature of prospecting; sampling; etc.

Tasmania. The Blue Tier Tin Field of North-East Tasmania, J. B. Lewis. Chem. Eng. & Min. Rev., vol. 16, no. 183, Dec. 5, 1923, pp. 90-94, 7 figs. Description of deposits; geology.

TIN MINES

Australia. Report on St. Patrick Tin Mine, Herberton, L. C. Ball. Queensland Govt. Min. Jl., vol. 24, no. 283, Dec. 15, 1923, pp. 451-456, 7 figs. Location, history, workings, geology.

Tasmania. Notes on the Lindsay Reward Tin Mine, Western Tasmania, D. V. Allen. Australasian Inst. Min. & Metallurgy—Proc., no. 51, Sept. 30, 1923, pp. 47-51. Geology, and occurrences of the varied minerals.

TIN MINING

California. Early Tin Mining in California, H. E. West. Eng. & Min. Jl.-Press, vol. 117, no. 2, Jan. 12, 1924, pp. 55-57, 3 figs. Reminiscenses of first commercial production of block tin in United States.

Tasmania. Exploitation of a Large Low-Grade Tin Deposit, J. B. Lewis. Chem. Eng. & Min. Rev., vol. 16, no. 192, Sept. 5, 1924, pp. 462-467, 6 figs. Methods and equipment of Anchor tin mine at Lottah, N. E. Tasmania.

TIN PLATE

Lithographing. See LITHOGRAPHING, Steel Sheets and Tin Plate.

Machinery for. Tin-Plate Machinery (Ueber Verzinnmaschinen), W. Krämer. Stahl u. Eisen, vol. 44, no. 25, June 19, 1924, pp. 713-715, 4 figs. Discusses Abercarn and Thomas & Davies types of tin-plate machinery and their advantages.

Manufacture. New System for Manufacture of Tin Plates (Nuovo sistema di fabbricazione per lamiere stagnate), G. R. Brasioli. Metallurgia Italiana, vol. 16, no. 9, Sept. 1924, pp. 388-393, 7 figs. Details of Schlötter process of producing tin plate by electrolytic means, and its successful application in Germany. Cost data.

The Manufacture of Tin Plate in India, F. L. Estep. Iron Age, vol. 114, nos. 18 and 19, Oct. 30 and Nov. 6, 1924, pp. 1122-1128 and 1197-1198 and 1261, 11 figs. Problems met in introducing manufacture into India; modifications made by American engineers to meet climatic conditions.

Tin-Plate Manufacture. Travelers Standard, vol. 12, no. 5, May 1924, pp. 105-110. Describes modern method of manufacture and gives precautions to be taken for protection of workmen.

TINNING

Thickening of Molten Tin. Origin and Prevention of the Formation of Undesirable Thickening of Molten Tin (Entstehung und Verhütung schädlicher Verdickungen bezw. Legierungen feuerflüssiger Zinnbäder), B. Haas. Zeit. für die Gesamte Giessereipraxis, vol. 45, no. 15, Apr. 12, 1924, pp. 33-34. Molten tin combines with iron, forming an alloy that thickens tin bath, impairs process of tinning, and wastes metal. It is recommended to tin vessels containing tin bath and to pickle and preheat articles to be tinned.

TIRES

Locomotive. See LOCOMOTIVES, Tires and Forgings, Manufacture.

TIRES, RUBBER

Anti-Creep Rims for. A New Principle in Tyre Fitting. Motor Transport (Lond.), vol. 39, no. 1035, Dec. 29, 1924, pp. 799-800, 6 figs. Expansion rim construction safeguarding against "creeping;" possibility of eliminating tire press for fitting solids.

Balloon. Automotive Industry Accepts Balloon Tires—with Many Reservations, H. Chase. Automotive Industries, vol. 51, no. 1, July 3, 1924, pp. 22-29. Summary of replies received to questionnaire concerning balloon tires and rim equipment intended for their use. Four-ply type favored; many see need for wider rims and are disposed to give drop-base variety careful consideration.

Balloon and "Balloon Type" Tires. India Rubber Wld., vol. no. 69, no. 6, Mar. 1, 1924, pp. 371-372, 2 figs. Confusion caused by two distinct developments; standard sizes; need of approved inflation pressures; changeovers from regular to balloon-tire equipment; the case for "balloon type" tires.

Building Balloon Tires. India Rubber World, vol. 69, no. 4, Jan. 1, 1924, pp. 217-218, 5 figs. Reason for balloon tires; production operations similar to high-pressure tires; Thropp system; band building; applying fabric bands.

Dunlop Cord Balloon Tyres. Auto-Motor Jl., vol. 29, no. 35, Aug. 28, 1924, p. 722, 1 fig. Describes new Dunlop balloon tire; shows how wired edge of cover at one part of rim is depressed into well in center of rim, allowing edge of cover to be lifted over rim edge at opposite diameter.

Bicycle. Manufacture of Cycle Tires. India Rubber World, vol. 69, no. 4, Jan. 1, 1924, pp. 227-228, 4 figs. Healey-Shaw process; describes fabric slitting, wire covering, spool wrapping, foundation building, vulcanizing.

Curing, Temperature Measurement. The Measurement of Temperature in Pneumatic and Solid Tyres During Cure, A. A. Perks and R. W. Griffiths. India-Rubber Jl., vol. 67, no. 1, Jan. 5, 1924, pp. 13-16 and 19-21, 11 figs. Use of a calibrated thermo-junction, inserted in required position, for obtaining record of temperature during cure at any part of a tire; details of methods which have proved successful, and some results obtained.

Design Problems. The Tyre as Part of the Suspension System, A. Healey. Automobile Engr., vol. 14, no. 197, Dec. 1924, pp. 406-414, 29 figs. Notes on area of contact between tire and road; non-skid properties of tires; stiffness; deflection under load; maximum size of tires for particular load; lateral stability of tires; actual value of damping coefficients; springs; behavior of car traveling over bad roads; balloon tires; solid tires.

Low-Pressure. See Balloon.

Manufacturing Costs. Tire Factory Manufacturing Costs, J. J. Dawson. India Rubber Wld., vol. 70, nos. 1, 2, 3 and 4, Apr. 1, May 1, June 1, and July 1, 1924, pp. 436-438, 503-505, 576-578 and 653-654, 8 figs. Continuous process system; purchases and material accounts; purchase register and material ledger; payroll and payroll analysis; production reports; chart of accounts; purchase and contract, accumulation, departmental, and "in process" accounts.

Molds and Forms for. How Automobile Tire Molds Are Made, Chas. O. Herb. Machy. (N. Y.), vol. 30, no. 7, Mar. 1924, pp. 497-500, 9 figs. Turning and boring mold and form, and engraving tread design in mold.

Machine Shops Problems in Making Tire Molds, H. P. Armson. Can. Machy., vol. 32, no. 2, July 10, 1924, pp. 19-21 and 39, 5 figs. Also Can. Foundryman, vol. 15, no. 7, July 1924, pp. 22-24 and 34, 4 figs. Turning molds to shape; engraving tread designs. Features of production at Toronto plant of Potts Pattern and Machine Co.

Non-Skid. Two Notable Tyre Developments. Motor Transport (Lond.), vol. 39, no. 1017, Aug. 25, 1924, pp. 243-244, 6 figs. Low pressure pneumatic and new design of solid tire that show phenomenal non-skid capacity.

Standardization. Is Any Progress Being Made on Balloon Tire Standardization, H. Chase. Automotive Industries, vol. 51, no. 24, Dec. 11, 1924, pp. 996-1000, 3 figs. Trend is toward fewer sizes, wider rims and treads designed to equalize wear over entire width; requirements of 28 of 55 manufacturers limited to five tire sizes.

TITANIUM

Effect in Iron Castings. See IRON CASTINGS, Titanium Additions.

Spectrum. See SPECTRA, Vanadium.

White. See PIGMENT, Titanium White.

TOLERANCES

[See also MEASUREMENTS, Length.]

Cylindrical Machine Parts. Tolerances (Toleranser), H. Törnebohm. Teknisk Tidskrift, vol. 54, nos. 42 and 46, Oct. 18 and Nov. 15, 1924, pp. 109-113 and 121-125, 19 figs. System of fits and tolerances of cylindrical machine parts, as devised by Swedish Engineering Standards Committee and proposed for acceptance as national Swedish standard. Comparison with similar systems developed by other countries show that each country seems to prefer a slightly different system.

Limits. Requirements of a System of Limits, M. E. Steczynski. Sibley Jl. Eng., vol. 38, no. 6, June 1924, pp. 139-146 and 155-156, 5 figs. Fundamental principles involved in logical development of satisfactory system.

Tap Threads. See TAPS, Standard Tolerances for.

Taps, Standardization for. Standardizing Tolerances for Taps, W. Daley. Am. Mach., vol. 60, no. 6, Feb. 7, 1924, pp. 217-219. Analysis of limits and tolerances adopted by Tap and Die Inst.; table showing progression of tolerances for all practical diameters and pitches.

TOLUENE

Vapor, Specific Volume. See VAPORS, Specific Volumes.

TOOL ROOMS

Bonus System for. See BONUS SYSTEMS, Tool-Room Application.

TOOL STEEL

Annealing. New Annealing Practice for Tool Steels, A. T. Clarage. Iron Age, vol. 113, no. 14, Apr. 3, 1924, pp. 1019-1020, 2 figs. Preliminary heat treatment by electricity instead of fuel; large-scale commercial operation found practical.

Hardness and Cutting Trials. Hardness and Cutting Trials of a Tool Steel, Dempster Smith and Israel Hey. Engineer, vol. 137, no. 3562, Apr. 4, 1924, pp. 366-368, 8 figs. See also Machy. (Lond.), vol. 24, nos. 602, 603, and 604, Apr. 10, 17, and 24, 1924, pp. 51-53, 92 and 113-116, 11 figs.; and Mech. World, vol. 75, nos. 1947 and 1948, Apr. 25, and May 2, 1924, pp. 255-258 and 272-274, 9 figs. Hardness observations on tool steel; cutting tests in Herbert tool-steel testing machine; cutting trials with tools held in turret of ordinary lathe; variation in vertical force with speed of cutting; durability trials with hardened tools subjected to different subsequent heat treatments.

Hardness Tests. Comparative Tests of Hardness of Various Steel Tools at High Temperatures (Essais comparatifs de dureté à chaud sur divers aciers à outils), J. Cohade. Revue Universelle des Mines, vol. 1, no. 2, Jan. 15, 1924, pp. 75-104, 16 figs. See also (abstracted translation), Mech. Eng., vol. 46, no. 4, Apr. 1924, p. 214. Brief review of previous work on subject and discussion of author's own tests, carried out at works of Schneider & Co. at Creusot, France; describes heat treatment to which steels were subjected previous to tests and method of testing, and gives results obtained.

Testing. Chemical and Metallographic Testing of Tool Steel (Werkzeugstahl, seine chemische und metallographische Prüfung), H. Graefe. Werkstattstechnik, vol. 18, no. 23, Dec. 1, 1924, pp. 682-689, 27 figs. Taking of samples; classifying commercial tool steels according to their composition; application of metallography; practical examples.

Time and Temperature, Effects on. The Effects of Time and Temperature on Certain Special Steels, W. E. Woodward. West of Scotland Iron & Steel Inst.—Jl., vol. 31, part 2, Nov., Session 1923-24, pp. 32-34 and (discussion) 35-39, 23 figs. on supp. plates. Describes work undertaken to see if some modern steels said to be suitable for high-speed steel tools would exhibit some phenomena which might afford clue as to their reputed properties; use of Landon dilatometer for measuring expansion and contraction of moderately sized specimens.

TOOLS

Counterbores. See COUNTERBORES.

Cross-Slide Facing. Cross Slide Facing Tools for Automatics, F. O. Hickling. Machy. (Lond.), vol. 23, no. 589, Jan. 10, 1924, pp. 483-484, 3 figs. Discusses troubles that are encountered and gives examples of how difficulties have been overcome.

Cutting. See CUTTING TOOLS.

Designing for Production Manufacturing. Tool Designing for Production Manufacturing, P. V. Miller. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 445-448, 5 figs. See (abstract) in Am. Mach., vol. 61, no. 19, Nov. 6, 1924, pp. 739-740. Discusses most important points to be considered in designing and building of tools, with special reference to more common types of drill jigs and milling fixtures.

Drills. See DRILLS.

Files. See FILES.

Flexible-Shaft-Driven. Power Tools with Flexible-Shaft Drive (Kraftwerkzeuge mit Drahtwellenantrieb), W. Schwarz. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 237-240, 9 figs. Points out advantages of power transmission by means of a flexible wire shaft.

Heat Treatment. See STEEL, HEAT TREATMENT OF, Carbon and High-Speed Tools.

High-Speed, Heat Treating. See ELECTRIC FURNACES, Heat-Treating.

High-Speed Steel. See STEEL, HIGH-SPEED, Cast Tools.

Locating Holes in Angular Face. Tool-room Formulæ for Locating Holes in Work with Angular Faces. Machy. (Lond.), vol. 24, no. 607, May 15, 1924, pp. 201-203, 4 figs. Formulas developed for use of toolmaker when work requires accurate location of hole in angular face.

Pneumatic. Testing Device for Pneumatic Tools with Motion To and Fro (Versuchstand für Presstuftwerkzeuge mit hin-und hergehender Bewegung), H. Wallot. Zeit. für komprimierte u. flüssige Gase, vol. 23, nos. 7, 8, and 10, 1923-1924, pp. 73-78, 85-88, and 109-112, 10 figs. Details of design and construction of apparatus for measuring and recording internal conditions in pneumatic tools with piston movement.

See also FOUNDRIES, Pneumatic Tools; PNEUMATIC TOOLS.

Salvage. Tool Salvage, L. A. Churgay. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 456-460, 7 figs. Points out that all worn,

broken, and obsolete tools should be kept in separate containers; standard forms of purchase and inter-department requisitions are described and their usage specified.

Sheet-Metal Work. Comparative Methods of Tool Design, D. H. Chason. Mech. Eng., vol. 46, no. 9, Sept. 1924, pp. 531-534 and 538, 9 figs. Discussion in relation to quantity production of sheet-metal parts.

Stellite. Recent Results Obtained with Stellite Tools (Neue Ergebnisse mit Stellitwerkzeugen), H. Märkle. Maschinenbau, vol. 3, no. 9, Feb. 14, 1924, pp. 235-237. Favorable results of recent tests.

Storage. A Practical System of Tool Storage and Control, F. A. Pope. Factory, vol. 33, nos. 2 and 3, Aug. and Sept., 1924, pp. 208-211 and 346-347, 420, 422, and 424, 10 figs. Shows how centralized storage, flexible shelving, mechanical handling equipment, and systematic grouping of tools have in one shop given clean-cut but economical control over tools. Methods of Worthington Pump & Machy. Co.

TORPEDO BOATS. See WARSHIPS, Torpedo Boats.

TORQUE

Measurement. See MEASURING INSTRUMENTS, Torsion Meter.

TORSIOGRAMS. See OIL ENGINES, Torsiograms of.

TORSION

Steel Rods. Some Effects Due to Permanent Torsion of Steel Rods of Circular Section (Quelques effets dus à des torsions permanentes de barreaux d'acier à section circulaire), J. Seigle. Revue de l'Industrie Minérale, no. 96, Dec. 15, 1924, pp. 568-574, 15 figs. Results of experiments with rods of 2-8 mm. diameter as to state of the various cylindrical layers of rod after permanent torsion, effect of annealing, apparent elongation and contraction.

Tests. See METALS, Deformation.

TORSION BALANCE

Eötvös. See PROSPECTING, Electrical.

TORSION METER. See MEASURING INSTRUMENTS, Torsion Meter.

TOWERS

Transmission-Line. See ELECTRIC TRANSMISSION LINES, Construction.

Water. See WATER TOWERS.

TOWING

Elastic. Elastic Towing, S. Miller. Mar. Eng., vol. 29, no. 11, Nov. 1924, pp. 657-662, 6 figs. Investigation of deep sea towing; model experiments at Washington; details of new automatic tension towing engine.

Electric. Electric Haulage on the Marne-Rhine Canal (Nouvelle installation de halage électrique sur le canal de la Marne au Rhin). Bul. Technique du Bureau Veritas, vol. 6, no. 7, July 1924, pp. 121-123, 3 figs. Particulars of Cheneau system; speed of towing is 1.6-3.5 kg. per hour.

TOWN PLANNING. See CITY PLANNING.

TRACTORS

Applications. Industrial and Commercial Applications of the Tractor, G. D. Babcock. Soc. Automotive Engrs.—Jl., vol. 15, no. 3, Sept. 1924, pp. 199-205, 16 figs. Heat treating of track shoes; lubrication of track; variation of size of calks; use, with tractors, of various accessories, such as rotary snow plows, timber-cutting machines, road graders and scrapers, and operations such as scarifying of old asphalt, Southern logging and swabbing of oil wells, are described. See (discussion) in no. 6, Dec. 1924, pp. 536-538.

Building. See INDUSTRIAL MANAGEMENT, Tractor Plant.

Caterpillar. Caterpillar Tractor in the Lumber Industry. (Der WD-Raupenschlepper in der Holzindustrie). Hanomag-Nachrichten, vol. 11, no. 126, Apr. 1924, pp. 49-68, 23 figs. Description of a type of caterpillar tractor combined with a hoist, which is used to fell trees and to haul them away. Calculations proving its economical superiority to use of animal power; testimonials; list of users.

Caterpillar Tractors in Road Making. Motor Transport (Lond.), vol. 39, no. 1010, July 7, 1924, pp. 25-27, 5 figs. How their employment in conjunction with mechanical excavating equipment economises time and labor.

The M.T.W. Caterpillar Tractors (Der "M.T.W."-Raupenschlepper). Wirtschaftsmotor, vol. 6, no. 3, Mar. 25, 1924, pp. 7-8, 3 figs. Type of small tractor developed by firm of Poehl, Berlin, Germany.

Cross-Country. Traction Across Rough and Roadless Country, L. A. Legros. Engineering, vol. 117, nos. 3035, 3036, and 3037, Feb. 29, Mar. 7 and 14, 1924, pp. 282-286, 316-319, and 347-350, 63 figs. General consideration of problem; examination of qualities that cross-country tractor possess, and general features of such tractors.

Farm. The General Purpose Farm Tractor, F. A. Wirt. Agricultural Eng., vol. 5, no. 5, May 1924, pp. 102-104, 1 fig. An efficient source of mechanical power that can be used not only for customary tractor drawbar and belt operations, but also, when properly equipped and adjusted, for efficient cultivating, and other light drawbar work now more commonly done with horses. Why next big development in tractor industry is expected to be a general purpose tractor.

Farm, Specifications for. British and American Agricultural Tractor Specifications. Automotive Industries, vol. 50, no. 8, Feb. 21, 1924, pp. 453-457. Tabular data.

German. German Power Tractors for Agricultural Purposes, G. Fischer. Eng. Progress, vol. 5, no. 8, Aug. 1924, pp. 141-147, 14 figs. Discusses small motor plows, traveling speed, grippers for motor plows, tractor plows, and fuels for power plows.

Military. British Four-Wheel Drive Military Tractor Has Six Forward and Two Reverse Speeds, M. W. Bourdon. Automotive Industries, vol. 51, no. 24, Dec. 11, 1924, pp. 1002-1004, 6 figs. Six-cylinder engine has dry sump lubrication, worm drive, pneumatic tires; transmission brakes act on four wheels.

The New Corps Tractor. Army Ordnance, vol. 5, no. 25, July-Aug. 1924, pp. 443-445, 5 figs. Experimental corps tractor delivered to Aberdeen Proving Ground for test was designed and built to meet requirements of Caliber Board; track-laying vehicle, using conventional type of track; gives general specifications.

See also TRANSPORTATION, Military.

Roadless Transport. Four Different Tractor Types Developed for Use in Roadless Areas, L. A. Legros. Automotive Industries, vol. 50, nos. 15 and 16, Apr. 10 and 17, 1924, pp. 820-826 and 868-872, 41 figs. Armstead snow-motor, Pavesi jointed tractor, Kegresse chain track and Renault multi-wheeled vehicle are typical of devices built for rough country work. (Abstract.) Paper read

before Brit. section of Société des Ingenieurs Civils de France.

Roadless Traction Progress. Motor Transport (Lond.), vol. 38, no. 1002, May 12, 1924, pp. 591-592, 3 figs. Details of new half-track creeper machine adapted to 1-ton chassis made by Roadless Traction, Ltd., Hounslow.

Traction Away from Roads (La traction hors route), M. L.-A. Legros. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 77, no. 1-2-3, Jan.-Mar. 1924, pp. 7-32, 25 figs. Describes American snow motor for snow and ice; Pavesi tractor for very uneven ground; Kegresse tractor for all kinds of ground; gives details of their design and construction.

Thornycroft. Thornycroft's Latest Development. Motor Transport (Lond.), vol. 39, no. 1028, Nov. 10, 1924, pp. 553-556, 8 figs. Particulars of a new 4-wheel-driven pneumatic-tired tractor; 6-cylinder engine, developing 90 b.hp. at 1200 r.p.m.

Tracklayer Type. The "Sentinel-Roadless" Tractor. Engineering, vol. 118, no. 3073, Nov. 21, 1924, p. 717, 2 figs. See also Engineer, vol. 138, no. 3595, Nov. 21, 1924, p. 592, 3 figs. Describes steam tractor with track-laying equipment; results of tests.

Trailers. See TRAILERS.

TRADE UNIONS

Nova Scotia. The Beginning of Trade Unions in Nova Scotia, Rob. Drummond. Can. Inst. Min. & Metallurgy—Bul., no. 152, Dec. 1924, pp. 914-932. Events leading up to organization of provinicial workmen's association; and beneficial measures secured in interests of workers by organization.

Roumania. See LABOR, Organizations, Roumania.

TRAFFIC

Automobile, Improvement of. Private Auto Traffic, Z. C. Elkins. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 102-106 and (discussion) 106-108. Constructive suggestions for improvement of automobile traffic conditions; emphasizes need for more through streets and reduction of parking privileges in congested section of Chicago; strict regulation of pedestrian traffic and increased use of signals at intersections recommended.

Bus. Studying London's 'Bus Traffic. Motor Transport (Lond.), vol. 39, no. 1016, Aug. 18, 1924, pp. 199-202, 6 figs. How London General Omnibus Co. check their traffic, and what they deduce therefrom.

City Planning and. See CITY PLANNING, Traffic in Relation to.

City Problems. Elements of the City Traffic Problem Reviewed, J. R. Bibbins. Eng. News-Rec., vol. 92, no. 1, Jan. 3, 1924, pp. 12-13. Examples of representative examples; technical elements; what to do about it.

City Streets and. See CITY PLANNING, Highways and Traffic.

Congestion Relief. Alleviation and Remedy of Street Congestion, H. Bartholomew. Eng. News-Rec., vol. 92, no. 18, May 1, 1924, pp. 766-767. Misuse of street space; improper routing; unscientific street plans; increasing street space; decentralizing business, centralized traffic control.

City Planning and Traffic Congestion. Elec. Traction, vol. 20, no. 7, July 1924, pp. 303-307. Discusses relation which building construction and street layout bear to problem of traffic congestion; economic causes and cures for modern bedlam in city streets.

Decentralization a Real Answer to Street Congestion, H. Bartholomobew. Elec. Ry. Jl., vol. 63, no. 10, Mar. 8, 1924, pp. 366-369. Suggestions for reducing street congestion and for traffic relief. Abstract of paper read at Am. Elec. Ry. Assn. midyear meeting.

Projects for Relief of Traffic Congestion in New York and Its Environs, E. P. Goodrich and H. M. Lewis. Am. City Mag., vol. 31, no. 1, July 1924, pp. 29-31, 2 figs. Summary of causes of congestion and of important specific suggestions for relief.

Control. Important Points in Traffic Control, J. R. Bibbins. Elec. Ry. Jl., vol. 63, no. 9, Mar. 1, 1924, pp. 325-328, 3 figs. Analysis of four important points in traffic control with their effect on street congestion; suggestions made for practical relief.

Signal Systems for Speeding Traffic and Avoiding Accidents. Safety Eng., vol. 46, no. 6, Dec. 1923, pp. 268-276, 11 figs. Methods of dealing with traffic problems in congested districts; use of flashing signals.

The Rotary Traffic Control System, G. T. Seabury. Good Roads, vol. 67, no. 1, July 1924, pp. 10-11 and 14, 3 figs. Two systems of rotary control have been installed in city of Providence at suggestion of Providence Safety Council and have met with universal approbation of driving public. Element principle of rotary control is that all vehicles proceed around square in same direction.

Estimation of Future. Methods of Estimating Future Street Traffic, E. P. Goodrich. Eng. & Contracting (Roads & Streets), vol. 62, no. 5, Nov. 5, 1924, pp. 1031-1033. Steps for determining future population, its distribution and activities.

High Buildings, Effect of. Effect of High Buildings on Traffic and Light, T. Adams and H. L. Seymour. Contract Rec., vol. 38, no. 45, Nov. 5, 1924, pp. 1102-1106, 3 figs. Study of development of a city block in Toronto which includes highest building in Empire. Tall structures preferable on north and south streets.

Highway Safety. Traffic Control and Safety, E. W. James. Public Roads, vol. 5, no. 6, Aug. 1924, pp. 1-9 and 19, 14 figs. Review of existing methods and devices for promoting highway safety.

Improvement of. Relation of Transportation to the Chicago Plan, E. S. Taylor. West. Soc. Engrs. —Jl., vol. 29, no. 3, Mar. 1924, pp. 116-122 and (discussion) 122-126, 4 figs. Outline of some of the more important improvement projects which are now under consideration by Chicago Plan Commission; more through-streets is one of its principal recommendations.

See also SIDEWALKS.

New York City. Improvement of Traffic Routes, H. W. Levy. Engrs. & Eng., vol. 41, no. 11, Nov. 1924, pp. 297-299. Traffic problems of Borough of Manhattan and plans for solving it.

Pedestrian, Improvement of. Pedestrian Traffic, H. E. Young. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 65-86, 19 figs. Points out that since greatest numbers of persons on our streets are within pedestrian class, street improvements should be considered from standpoint of benefit to come to them. Advantages and disadvantages to be gained from different schemes that have been proposed from improvemetn of pedestrian traffic in Chicago, particularly in downtown districts.

Regulation and Street Plans. Traffic Problems and Suggested Remedies. Pub. Works, vol. 55, no. 6, June 1924, pp. 177-180, 2 figs. Providing parking for automobiles, increase of traffic beyond street capacity, and poor street planning are chief

problems reported; 200 city engineers suggest remedies.

Signals. See SIGNALING, Street.

Surveys. Results of Traffic Surveys, J. G. McKay. Eng. & Contracting (Roads & Streets), vol. 62, no. 1, July 2, 1924, pp. 26-30. Gives findings and deductions and their lessons for road engineer. From paper read at Am. Roadbldrs. Assn. convention.

Zoning. See ZONING.

TRAILERS.

[See also AUTOMOBILES, Trailers.]

Motor-Transport. Details of the H. I. C. Motor Transport Trailer. Engineering, vol. 117, no. 3032, Feb. 8, 1924, p. 186, 13 figs. partly on p. 178. Has advantage of shock reduction through exceptional springing.

TRAIN HEATING. See CAR HEATING.

TRANSFORMERS

Abnormal-Current, Secondary Voltages in. Abnormal Current Transformer Secondary Voltages, R. Brown. Power, vol. 60, no. 4, July 22, 1924, p. 130, 2 figs. Results of recent tests made at Univ. of Cal. to visualize wave form of secondary voltage of a 60- to 5-ampere current transformer having 14 turns on primary and 164 turns on secondary.

Capacity. The Theory of Capacity Transformers (Zur Theorie des Kapazitätstransformators), G. Probst. Elektrotechnische Zeit., vol. 45, no. 28, July 10, 1924, pp. 750-751, 4 figs. Discusses drawbacks in construction of inductivity machines and shows advantages of capacity machines for small power, advantages of capacity transformers over inductivity transformers.

Cars for Shipping. See CARS, FREIGHT, Transformer Transportation.

Castings. See IRON CASTINGS, Transformer-Box-Production.

Connections. Transformers Connected for Operation on a Three-Phase Circuit, B. A. Briggs. Power, vol. 59, no. 17, Apr. 22, 1924, pp. 639-641, 6 figs. Describes different connections for three single-phase transformers.

Cooling. Transformer Cooling, E. R. Stauffacher. Jl. of Elec., vol. 52, no. 11, June 1, 1924, pp. 451-463, 25 figs. A new development of A. B. O. type transformer; description of some cooling systems; experiments on cooling transformer oil in automobile type radiators; automatic reclosing circuit breaker; status of automatic a.c. substations; relays and relay application; calculating tables for calculating short-circuit currents on system; proposed change in transformer polarity, etc.

Core. Calculation of Core Transformers (Berechnung von Kernstransformatoren), P. Andronescu. Elektrotechnische Zeit., vol. 45, nos. 32 and 33, Aug. 7 and 14, 1924, pp. 845-848 and 870-876, 13 figs. Deduces new relations which with data given enables making proper assumption for seven special magnitudes on which precalculation must be based.

Cores, Aging. See IRON AND STEEL, Magnetic Aging.

Dry vs. Oil. Dry and Oil Transformers (Trockentransformator und Oeltransformator), M. Vidmar. Elektrotechnik u. Maschinenbau, vol. 42, no. 6, Feb. 10, 1924, pp. 78-82. Result of investigations shows that oil transformer is more expensive than dry transformer, and has greater losses; advantages of latter type are pointed out, but it is claimed that older types of dry transformers should be discarded in favor of more modern type, in which air is utilized simultaneously as cooling and insulating medium.

Efficiency Calculation. A Simplified Slide Rule Method for Calculating Transformer Efficiencies, N. Lee. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1040-1042. Outlines method developed by author.

Harmonics. See HARMONICS, Transformers.

High-Reactance. The Design of Small High-reactance Transformers, R. H. Chadwick and D. W. Merchant. Gen. Elec. Rev., vol. 27, no. 10, Oct. 1924, pp. 682-685, 3 figs. In small transformers it is frequently more economical to obtain high leakage reactance by use of magnetic shunts, or stacks of steel punchings between coils. Description of this departure from conventional transformer design, together with explanation and example of its method of calculation.

High-Voltage. High-Voltage Transformer Designe (Ueber die Anwendung der Theorie der konformen Abbildung zur Berechnung der Durchschlags- und Ueberschlagsspannung zwischen kantigen Konstruktionsteilen unter Oel), L. Dreyfus. Archiv für Elektrotechnik, vol. 13, no. 2, May 31, 1924, pp. 123-145, 34 figs. Determines relation connecting breakdown voltage with distance apart of two angular electrodes, and in particular considers following cases of discharge: (1) between two plates; (2) between right-angled angular electrode and a plate; (3) between infinitely thin plate and plate set at right angles to it; application of theoretical results to problems arising in connection with oil-insulated transformers.

High-Voltage Testing. Transformers for Very High Voltage Tests. Elec. Rev., vol. 94, no. 2407, Jan. 11, 1924, pp. 61-62, 6 figs. Describes high-voltage testing transformers manufactured by Ferranti, Ltd., aggregating two million volts.

Inspection. Transformer Inspections. Elec. Wld., vol. 84, no. 9, Aug. 30, 1924, pp. 412-414, 2 figs. Methods employed by People's Light Co. of Davenport, Iowa. Demand determinations made yearly. Five-year results.

Insulation Tests. Effects of Time and Frequency on Insulation Test of Transformers, V. M. Montsinger. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 145-155, 24 figs. Investigation to determine proper and fair length of time to make induced-voltage test when frequency is higher than normal, and main points brought out in investigation.

Insulation Tests of Transformers as Influenced by Time and Frequency, F. J. Vogel. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 627-633, 26 figs. Types of insulation failure and methods of testing. Application of data to tests on apparatus.

Large-Capacity. Some High Points on Modern Transformers, A. Palme. Power, vol. 59, no. 11, Mar. 11, 1924, pp. 402-403, 7 figs. Few examples of recently built large-capacity transformers, together with short description of their salient features.

Oil-Cooled. Permissible Overloads of Oil-Cooled Transformers (Zulässige Ueberlastungen von ölgekühlten Transformatoren), F. Sieber. Elektrotechnische Zeit., vol. 45, no. 29, July 17, 1924, pp. 769-771, 5 figs. Determines values for overloads and their duration, assuming that overload was preceded by permanent load less than full load.

Oils. A New Sludging Test for Transformer Oils, W. H. Nuttall. World Power, vol. 2, no. 8, Aug. 1924, pp. 92-96, 4 figs. Discusses interfacial tension between oil and water as bearing a definite relation to sludging properties of oil, and develops a method of determining sludge by means of it.

Action of Metals and Combinations of Metals on Transformer Oils (Einwirkung von Metallen und Metallkombinationen auf Transformatorenöl), H. von der Heyden and K. Typke. Petroleum,

vol. 20, no. 9, Mar. 20, 1924, pp. 320-325. Determination of changes produced in oils when sludge is formed; sludge formed consisted in most cases of metallic soaps; experiments with single metals and also with combinations of metals, and tables of results; results may be applied to explain behavior of turbine oils.

Conductivity and Dielectric Strength of Transformer Oil (Ueber die Leitfähigkeit und die dielektrische Festigkeit von Transformatorenöl), K. Draeger. Archiv. für Elektrotechnik, vol. 13, no. 5, Aug. 22, 1924, pp. 366-391, 10 figs. Shows that conductivity is mainly caused by electrolytic admixture; water in most minute form greatly affects conductivity; conductivity increases more rapidly with temperature than viscosity decreases. Bibliography.

Dehydration and Testing Transformer Oils and Transformer, W. R. Bowker. Southern Engineer, vol. 41, no. 2, Apr. 1924, pp. 54-56, 4 figs. Method for treatment of oils to eliminate moisture; identification of oils; insulation resistance test for transformers.

Disruptive Strength of Used Transformer Oils (Durchschlagsfestigkeit gebrauchter Transformatorenöle), Heyden and Typke. Elektrotechnische Zeit., vol. 45, no. 40, Oct. 2, 1924, p. 1059. Shows that even poor oils from used transformers, after filtering and dehydrating, have a regular disruptive strength of over 35 kv. per 5 mm.

Filtering Transformer Oil in the Field, F. C. De Weese. Power, vol. 60, no. 26, Dec. 23, 1924, pp. 1016-1017. Necessary equipment; order of procedure.

Measuring Dielectric Strength of Insulating Oils (Zur Messung der dielektrischen Festigkeit von Isolierölen), V. Engelhardt. Archiv für Elektrotechnik, vol. 13, no. 3, July 7, 1924, pp. 181-186, 2 figs. Details of experiments to establish influence of purification and drying of electrodes in puncture test, purified and dried oil being used.

Progress in Insulating Oil Purification (Fortschritte in der Reinigung von Isolierölen), H. Stäger. Schweiz. Elektrotechnischer Verein Bul., vol. 15, no. 8, Aug. 1924, pp. 377-384, 4 figs. Discusses disruptive strength of oil and shows that by centrifugal treatment not all water can be separated and that centrifuging at 50 deg. cent. increases hygroscopicity of oil.

The Dielectric Strength of High-Pressure Transformer and Switch Oils, H. D. Jukes. Elec. Rev., vol. 95, no. 2454, Dec. 5, 1924, pp. 845-847. Results of tests with a De Laval Chadburn centrifugal machine.

Transformer Oil-Testing Equipments. World Power, vol. 1, no. 4, Apr. 1924, pp. 249-251, 3 figs. Describes self-contained complete portable equipment for use with standard gap, produced by Johnson & Philips.

Transformer Oil (Transformatorenöle), M. v. d. Heyden and M. Typke. Elektrotechnische Zeit., vol. 45, no. 35, Aug. 28, 1924, pp. 931-935. Discusses purpose of oil and corresponding requirements; kinds and treatment of oils, refining, drying and preventing ageing, testing of new and used oils.

1875-Kva. Single-Phase. See ELECTRICAL MACHINERY, British Empire Exhibition.

Open-Delta Operation. Open-Delta Transformer Operation, A. Boyajian. Elec. World, vol. 83, no. 9, Mar. 1, 1924, pp. 417-418, 5 figs. Advantages and disadvantages of this connection from operating and commercial standpoints; method for computing regulation and capacity; correction for voltage unbalances.

Overloads. Hot Spots and Overload Indicators, H. Cole. Elec. Wld., vol. 84, nos. 7 and 8, Aug. 16 and 23, 1924, pp. 314-317 and 360-362, 6 figs. Results of studies made by Detroit Edison Co. to permit utilizing transformers more effectively without incurring serious overheating of insulation. Tests conducted to determine accuracy, time-lag, correct setting, etc.; limitation of overload indicators in practical operation.

Parallel Operation. The Parallel Operation of Three Phase Connected Transformers, W. H. Gregory. Elec. Engr., vol. 1, no. 7, Oct. 15, 1924, pp. 256-259, 7 figs. Discusses polarity, phase rotation, and angular displacement; voltage ratio; effect of impedance, resistance, and reactance on parallel operation; use of paralleling reactors for securing satisfactory parallel operation.

Radiotelephonic. See RADIOTELEPHONY, Transformers.

Rotary. Parallel Operation of Rotary Transformers (Parallelbetrieb von Drehtransformatoren), M. Bucov. Elektrotechnische Zeit., vol. 45, no. 26, June 26, 1924, pp. 674-677, 5 figs. Discusses connection of several rotary transformers to busbar; difficulties in parallel operation; arrangements and connections for parallel working.

Secondaries, Grounding. Grounding Transformers Secondaries, J. B. Gibbs. Power, vol. 60, no. 9, Aug. 26, 1924, pp. 323-324, 5 figs. Some of the principal rules concerning grounding of transformer secondaries.

Short-Circuit-Proof. Short-Circuit-Proof Current Transformers (Kurzschlusssichere Stromwandler), E. Zopf. Elektrischer Betrieb, vol. 22, no. 4, Feb. 24, 1924, pp. 27-28, 4 figs. Describes type of single- and multi-core short-circuit-proof transformers which have operated without disturbances wherever employed, often under most difficult working conditions; employed in industrial power plants, central stations and power plants of electric railways.

Silicon Steel in. The Magnetic Properties of Silicon Steel in a Large Transformer, Guerney H. Cole. Elec. Jl., vol. 21, no. 1, Jan. 1924, pp. 17-24, 43 figs. Study of magnetic properties of four-per-cent silicon steel in large transformer over wide range of flux densities; presents data in curve form giving magnitude of harmonic components of exciting current required to produce sinusoidal flux in silicon sheet steel for high, low, or intermediate densities.

Single- and Three-Phase. Characteristics and Shop Testing of Single- and Three-phase Power Transformers, J. W. Rogers. Mech. Wld., vol. 75, nos. 1946, 1951, and 1954, and vol. 76, no. 1957, Apr. 18, May 23, June 13, and July 4, 1924, pp. 242-243, 324-325, 370-372, and 8-9, 11 figs. General description of tests for copper loss and impedance, core loss, magnetic leakage, ratio and polarity, regulation, efficiency, ratio of core to copper losses, rating and temperature rise, insulation, and methods of calculating the various characteristics of a transformer from data obtained in shops.

Special Applications. Special Applications of Standard Transformers, J. B. Gibbs. Power, vol. 60, no. 22, Nov. 25, 1924, pp. 841-843, 5 figs. Factors to be considered when transformers are to be operated under other than rated conditions; amount of overload that can be safely carried; operating on other than normal voltage or frequency.

Static. Changing the Frequency by Means of Static Transformers, A. M. Taylor. Colliery Eng., vol. 1, no. 10, Dec. 1924, pp. 476-478, 3 figs. Results of experiments made by author; power-factor correction from secondary side; selectivity of transformer.

Mechanical Forces in Power Transformers. Power, vol. 60, no. 5, July 29, 1924, pp. 166-167, 11 figs. Elementary explanation of how mechan-

ical forces are set up in static transformers due to short-circuits or faulty switching, that have resulted in failure of windings.

Telephone. Telephone Transformers, W. L. Casper. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 197-209, 22 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1201-1202. Discusses frequency range over which telephone transformers must operate efficiently in transferring energy between two circuits and three most common limiting impedance combinations of these circuits; shows mechanical construction of various transformers made to give desired accuracy of speech transmission under their particular circuit conditions.

Testing. Methods for Testing Current Transformers, F. B. Silsbee. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 239-249, 6 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1173-1175, 2 figs. Critical discussion of various possible methods with data as to advantages and disadvantages of each; eleven distinct methods are described and supplementary suggestions are made concerning various types of detecting instruments, etc.

The Million-volt Testing Plant at Ivry, R. Borlase Matthews. Elec. Rev., vol. 94, no. 2409, Jan. 25, 1924, pp. 124-126, 4 figs. Details and equipment of laboratory designed by Cie Générale d'Electro-Céramique, in order to provide adequate plant for making electrical tests on insulators for transmission lines operating at 220,000 volts.

Three-Circuit. Theory of Three-Circuit Transformers, A. Boyajian. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 345-355, 10 figs. Discusses characteristics of 3-circuit transformers; scope and general aspects of problems; peculiar phenomena of theoretical interest; electrical network equivalent to magnetically interlinked circuits of 3-circuit transformer is developed; formulas for calculation.

Three-Phase. Polarity, Phase Rotation and Angular Displacement of Three Phase Transformers, W. H. Gregory. Elec. Engr., vol. 1, no. 4, July 15, 1924, pp. 119-121, 8 figs. Deals with several points regarding polarity, phase rotation and angular displacement of three-phase transformers and methods of obtaining same. Bibliography.

See also ELECTRICAL MACHINERY. British Empire Exhibition.

Transient Currents in. Transient Currents in Transformers, C. A. Melhuish. Ry. Signaling, vol. 17, no. 12, Dec. 1924, pp. 467-468, 5 figs. Explanation of cause of transient currents; how they affect signal operation.

Transverters. See TRANSVERTERS.

22,000-Kva. 22,000-kv-a. Transformers for Niagara Falls Development, F. F. Brand. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 6, June 1924, pp. 514-518, 4 figs. Spacing arrangements; insulation; cooling arrangements.

Two-Phase System. Transformers Connected for Operation on a Two-Phase Circuit, B. A. Briggs. Power, vol. 59, no. 3, Jan. 15, 1924, pp. 87-88, 4 figs. Transformers used on two-phased system must be of single-phase type, irrespective of whether single-phase or two-phase power transformation is to be accomplished.

Unbalanced-Load. The Current Conditions in Transformers Working on Unbalanced Load, F. Grieb. Brown Boveri Rev., vol. 11, no. 1, Jan. 1924, pp. 15-19, 8 figs. Discusses compensation of unbalanced loading of secondary of 3-phase transformers on primary side.

TRANSPORTATION

Aerial. See AVIATION, Aerial Transportation.

Automotive. Motor Transportation of the Future, E. Church. Automotive Mfr., vol. 66, nos. 7 and 8, Oct. and Nov. 1924, pp. 8-9 and 29, and 8-9. The problem as a whole; various agencies and part each will play; passenger and commercial cars, railroads, buses, terminals, road surfaces.

Barge Line. Federal Barge Line Proving Costly Experiment. Ry. Age, vol. 76, no. 6, Feb. 9, 1924, pp. 381-383, 3 figs. Mississippi-Warrior service and unprofitable venture, although handling capacity traffic.

Coördination of National Systems. Declarations of the Transportation Conference. Ry. Age, vol. 76, no. 3, Jan. 19, 1924, pp. 237-243. Findings and conclusions of Nat. Transportation Conference called by U. S. Chamber of Commerce in regard to governmental relations to railroad transportation, railroad consolidations, readjustment of relative freight rate schedules, relation of highways and motor transport to other transportation agencies, development of waterways and coordination of rail and waterway service, and taxation of transportation agencies. See also Ry. Rev., vol. 74, no. 3, Jan. 19, 1924, pp. 154-156.

Delivering Systems. The Problem of Delivery Equipment, W. Eldred. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 599-604. Investigation of delivery vehicles used by bakers; comparison of cost and efficiency of horse-drawn, gasoline, and electric vehicles in service.

Factory. See MATERIALS HANDLING, Factory.

Great Lakes System. The Transportation System of the Great Lakes, Geo. A. Marr. Mich. Technic, vol. 37, no. 3, Mar. 1924, pp. 5-9, 22 and 32, 5 figs. Types of vessels employed; loading and unloading facilities; freight and passenger traffic.

Highway. Commission Defines Its Authority Over Motor Trucks. Ry. Rev., vol. 75, no. 8, Aug. 23, 1924, pp. 285-286. Report of Interstate Commerce Commission discusses jurisdiction over various classes of highway transportation.

Findings and Deductions from Highway Traffic Surveys, J. G. McKay. Eng. News-Rec., vol. 92, no. 13, Mar. 27, 1924, pp. 526-530, 19 figs. Practical uses of transportation surveys enumerated; Connecticut and California surveys summarized in 19 original graphs; economic fields of truck transportation.

The Connecticut Highway Transportation Survey, J. G. McKay. Good Roads, vol. 66, nos. 5 and 6, May and June 1924, pp. 125-129, and 161-164, 184 and 186, 13 figs. Preliminary report on first three months of survey conducted by U. S. Bur. Pub. Roads and Connecticut State Highway Commission. Reprinted from Public Roads.

Theory and Calculation of Highway Transportation Cost, T. R. Agg. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 54-58, 2 figs. Economic life of road analyzed; annual cost formula developed; relation between vehicle and road; formula for vehicle costs.

Metropolitan Planning for Future Requirements. Metropolitan Planning for Future Transportation Requirements, J. R. Bibbins. Engrs. & Eng., vol. 41, no. 5, May 1924, pp. 119-135, 22 figs. General survey and growth, trends, and conditions; what some cities have done and have not done; the transportation plan.

Military. Military Transportation, L. B. Moody. Mich. Technic, vol. 37, no. 3, Mar. 1924, pp. 11-15 and 32, 11 figs. Outline of general principles, with special consideration of cross-country motor transport; types of military tractors and trucks.

Paris. Road Transportation in the Paris Region (Les transports en commun de la region

parisienne), Ch. Dantin. Génie Civil, vol. 85, nos. 15 and 16, Oct. 11 and 18, 1924, pp. 310-315 and 344-345, 11 figs. Particulars regarding motor-bus lines operating in this district, rolling stock, electric distribution systems of tramways, operating problems, etc.

Railway. Some Problems of Railroad Transportation, H. W. Thornton. Ry. Age, vol. 77, no. 18, Nov. 1, 1924, pp. 779-782. Reasons for state ownership; difficulties at large terminals; situation in Canada; points out that consolidations may make systems too large; fundamental principles essential to existence of railway as private enterprise. (Abstract.) Address before Inst. Am. Meat Packers and Univ. of Chicago.

The Place of Railway Transportation in the American Industrial Structure. Inst. Transport—Jl., vol. 5, no. 5, Mar. 1924, pp. 230-237. Report of Research Council of Nat. Transportation Inst. setting forth place of railway transportation in economic structure of America.

Railway, Motor-Truck and Bus. Relation of Railroad, Motor Truck and Bus. Ry. Age, vol. 77, no. 24, Dec. 13, 1924, pp. 1067-1070. Recommendations formulated at conference held in Boston, Mass., and sponsored by Nat. Automobile Chamber of Commerce: includes following contributions: Motor Vehicles Should Be Subject to Regulation, A. H. Swayne; The Railroads and Highway Transport, C. L. Bardo; Motorized Passenger Service Is Here to Stay, Jas. M. Swift; The Railroad's Relation to Motor Trucks, G. C. Woodruff.

Rapid Transit. See RAPID TRANSIT.

River. River Transportation, A. F. Crockett. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 1, Feb. 1924, pp. 1-12 and (discussion) 13-26, 5 figs. Discusses possible future of river transportation, development of waterways and terminals, and designing of barges to carry freight; motive power on rivers.

See also RIVERS, Mississippi, Transportation on.

Road. Road Transport in Relation to the General Transport Problem of the Country, R. J. Howley. Inst. Transport—Jl., vol. 5, no. 5, Mar. 1924, pp. 192-200 and (discussion), 201-207. Historical survey of transport; limits of competition, scope for road transport, the road question, transport legislation, organization of road transport, etc.

See also Highway.

Road, Horse vs. Mechanical Power for. Relative Efficiency of Horse and Mechanical Power for Road Transport, E. Falconer. Inst. Transport—Jl., vol. 5, no. 6, Apr. 1924, pp. 262-275, 9 figs. Scientific and mathematically sound facts which help owner or transport officer to decide whether for any given work motor or horse traction is more economical.

St. Lawrence and Hudson Bay Projects. The St. Lawrence River and Hudson Bay Projects. Eng. Jl., vol. 7, no. 6, June 1924. Discussion on Canada's water-transportation problems, including following contributions: Economic Examination of the Hudson Bay Projects, W. Nelson Smith, pp. 269-278, 1 fig.; The Hudson Bay Railway and Port Nelson, L. C. Nesham, pp. 278-282; The Hudson Bay Railway, J. L. Busfield, pp. 282-289, 4 figs.; The St. Lawrence River Waterway—Discussion, pp. 289-290.

Steam Railway Suburban. Steam Railroad Suburban Transportation in Chicago, F. E. Morrow, R. H. Ford, G. W. Hand, C. H. Mottier and A. W. Newton. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 127-132 and (discussion) 132-141. Amount of this business, its function in relation to transportation requirements of community, and plans for future development.

Street Car-Bus System. How Saginaw Has Co-ordinated Railway and Bus. Elec. Ry. Jl., vol. 63, no. 14, Apr. 5, 1924, pp. 531-534, 4 figs. Unified system of transportation result of people's referendum; 25 modern buses operate on three routes specified in 15-yr. franchise; control of system in hands of public; railway equipment rebuilt and painted.

Surface-Line. Surface Lines Transportation in Chicago, C. V. Weston. West. Soc. Engrs.—Jl., vol. 29, no. 3, Mar. 1924, pp. 155-165, 4 figs. Suggestions for relief of congestion of roadways in downtown district; seven-eighths of all people using transportation in Chicago ride on surface lines.

TRANSPORTERS

Temperley. See COAL HANDLING, Power Plants.

TRANSVERTERS

Highfield-Calverley. The Highfield-Calverley Transverter. Elec. Rev., vol. 94, no. 2431, June 27, 1924, pp. 1047-1048, 6 figs. Describes apparatus exhibited at British Empire Exhibition by English Elec. Co. Named by combining words "transformer" and "rotary converter" so as to indicate part it plays, primary function for which it was designed being conversion of alternating current into direct current at exceedingly high voltage.

Principle of. The Transverter. Engineering, vol. 117, no. 3044, May 2, 1924, pp. 563-566, 17 figs. partly on supp. plate. Primary function of apparatus is to convert ordinary alternating into direct current at exceedingly high voltage for purposes of transmission, and to reproduce alternating current by converse operation at point where power is to be distributed or used; name is combination of words transformer and rotary converter; principle upon which design is based and its useful field.

2000-Kw. See ELECTRICAL MACHINERY, British Empire Exhibition.

TRENCHING

Machinery for. See CONSTRUCTION WORK, Machinery for.

TRENCHING MACHINES. See GAS MAINS, Trenching Equipment.

TRESTLES

Renewal Under Traffic. Deck on Lucin Cutoff Trestle Renewed Under Traffic. Eng. News-Rec., vol. 92, no. 2, Jan. 10, 1924, pp. 61-62, 4 figs. Rot caused by rainwater necessitates renewal; new deck has watertight cover; timbers "treated" in lake water.

Timber Detour. Baltimore & Ohio Builds Detour Trestle to Aid Bridge Renewal, P. G. Lang, Jr. Ry. Eng. & Maintenance, vol. 20, no. 3, Mar. 1924, pp. 103-104, 3 figs. Construction of temporary timber structure simplifies problem; later dismantled and reclaimed.

TRINITROTOLUENE (T.N.T.). See EXPLOSIVES, T.N.T., Purification of; Specific Heats.

TRIPOLI

Mining and Preparation. Tripoli Mining and Preparation, R. B. Ladoo. Abrasive Industry, vol. 5, no. 3, Mar. 1, 1924, pp. 71-73, 2 figs. Explains difference between tripoli and diatomaceous earth; mining and preparation methods.

TROLLEY BUSES. See BUSES, Trolley.

TRUCKS

Industrial. See INDUSTRIAL TRUCKS.

Motor. See MOTOR TRUCKS.

TRUSTS

Vertical. See INDUSTRIAL ORGANIZATION, Vertical Trusts.

TUBES

Bending Stresses. Bending Stresses in Thin-Walled Tubes, J. Case. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 277, Jan. 1924, pp. 197-208, 6 figs. Investigation of stresses in thin tubular beam, such as steel factory chimneys, monocoque fuselages of airplanes, hulls of submarine vessels, and the like.

Brass, Annealing of. Annealing of Brass Tubing in the Electric Furnace, R. M. Keeney. Am. Electrochem. Soc.—Advance Paper no. 9, for meeting Oct. 2-4, 1924, pp. 137-147, 3 figs. Methods and equipment at plant of French Mfg. Co., of Waterbury, Conn. Electric brass annealing proved to be more economical than annealing with wood fuel.

Brass, Internal Stress Measurement. A Method for Measuring Internal Stress in Brass Tubes, R. J. Anderson and E. G. Fahlman. Inst. of Metals—Advance Paper no. 1, for meeting Sept. 8-11, 1924, 13 pp., 7 figs. partly on supp. plates. Nature of stress in drawn tubing. Strip method, developed by authors, for measurement of stress in drawn tubes.

Brass, Manufacture of. The Manufacture of Brass and Copper Tubes, G. Evans. Metal Industry (Lond.), vol. 25, nos. 10, 13, 14, 18, 19, 24, and 25, Sept. 5, 26, Oct. 3, 24, Nov. 7, Dec. 12 and 19, 1924, pp. 217-219, 297-299, 321-325, 395-396, 443-446, 565-566, and 589-592, 36 figs. Refinery or foundry for copper-billet casting. Development of piercing machines; present types of machines in use, their operation and adjustment. Suitable heating furnace and plan of typical modern piercing-mill layout. Coremaking for brass tube castings. Casting the shells in brass foundry. Hydraulic benches and chain benches.

Capillary, Calibration of. The Accurate Calibration of Capillary Tubes, K. J. Isaac and I. Masson. Jl. Physical Chem., vol. 28, no. 2, Feb. 1924, pp. 166-169, 1 fig. Describes method of ascertaining bore or volume of capillary glass tubes closed at one end, which enables one to know volume of any length of a 50-cm. capillary of about 1-mm. bore with an accuracy of one part in several thousand.

Charcoal-Iron, Manufacture. Producing Charcoal Iron Tubes, G. H. Woodroffe. Iron Trade Rev., vol. 74, no. 7, Feb. 14, 1924, pp. 482-487, 10 figs. Methods employed by Parkesburg Iron Co., Parkesburg, Pa., in manufacture of charcoal iron tubes.

Copper, Manufacture of. Manufacture of Brass and Copper Sheets and Seamless Drawn Tubes, A. Spittle. Metal Industry (Lond.), vol. 24, nos. 16, 17, and 18, Apr. 18, 25, and May 2, 1924, pp. 375-376, 399-402, and 427-430, 13 figs. In its broad outlines deals with methods common to the trade in general, and in detail with procedure practised at a particular works. From paper before Bradford Eng. Soc.

See also Brass, Manufacture of; CONDENSERS, STEAM, Tubes.

Cutting-Off Machine for. Designs New Cutting Off Machine, E. W. Mikaelson. Iron Trade Rev., vol. 74, no. 2, Jan. 10, 1924, pp. 173-176, 6 figs. Limited floor space is required for new unit which cuts off and reams tubing up to 14-in. diam. at rate of one a minute; automatic feeding mechanism provided.

Drawing. Drawing Small Tubes of Precious Metals, J. Williams. Am. Mach., vol. 61, no. 8, Aug. 21, 1924, pp. 307-308, 3 figs. Tools and methods used in laboratory production.

Secondary Failure. On the Secondary Failure of Thin Tubes of Circular Section Subjected to Terminal Couples, M. S. Ahmed. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. Sci., vol. 47, no. 278, Feb. 1924, pp. 319-323, 3 figs. Investigation to determine under what conditions secondary stresses due to deformation of cross-section into oval shape exceed primary stresses found on ordinary theory of pure bending.

Solid-Wall, Manufacture of. Making Solid Wall Tubes of Strip Steel. Iron Age, vol. 113, no. 19, May 1, 1924, pp. 1293-1294, 2 figs. New method of manufacturing brass, copper and steel tubing by continuous process developed by Bundy Tubing Co., Detroit; material wide enough to give double thickness of wall; tinned before rolling; walls soldered together by heat.

Steel. Making Steel Tubes for Roller Bearings, F. L. Prentiss. Iron Age, vol. 114, no. 23, Dec. 4, 1924, pp. 1463-1469, 8 figs. Electric-furnace plant for alloy steel; from ingot to seamless tube in series of mills; piercing mill used.

Steel, Seamless. Manufacture of Seamless Steel Tubes and Cylinders, A. R. Chaytor. Mech. World, vol. 75, no. 1932, Jan. 11, 1924, pp. 27-29. Historical review; difficulties encountered in early processes; material for manufacture; process and plant employed in manufacture; cold drawing.

Manufacture of Seamless Steel Tubing, W. C. Chancellor. Engrs.' Soc. West. Pa.—Proc., vol. 40, no. 6, July 1924, pp. 217-248, 36 figs. Details of rotary piercing process as distinct from cupping process and hydraulic piercing of solid slugs, and equipment used at Ellwood City Works of Nat. Tube Co.

TUBING

Steel and Duralumin. See AIRCRAFT CONSTRUCTION MATERIALS, Steel and Duralumin Tubing.

TUGS

Diesel-Electric. A Diesel Electric Tug, F. L. DuBosque. Soc. Nav. Architects & Mar. Engrs.—Advance Paper, no. 12, for meeting Nov. 13-14, 1924, 8 pp., 13 figs. on supp. plates. See also Mar. Eng., vol. 29, no. 12, Dec. 1924, pp. 703-709, 15 figs. Comparative tests of Diesel-electric, direct Diesel and steam-driven tugs.

Another Diesel-Electric Tug Demonstrated. Motorship, vol. 9, no. 10, Oct. 1924, pp. 727-730, 8 figs. Particulars of Van Dyke III, of Atlantic Refining Co.; built entirely of steel; two 3-cylinder Ingersoll-Rand 4-cycle oil engines operating on Price-Rathbun Ingersoll-Rand direct-injection system; overall length, 97 ft.; beam, 21 ft.; depth, molded, 11 ft. 6 in.

Railroad Builds Diesel Electric Tug. Mar. Rev., vol. 54, no. 9, Sept. 1924, pp. 354-355, 4 figs. Design and construction of P. R. R. no. 16; length, overall, 105 ft.; beam, molded, 24 ft.; draft, 12 ft.; displacement, 340 tons; motive power is furnished by two Winton type full Diesel engines, 4-cycle, each having six cylinders, 13¼ in. in diameter and 18-in. stroke. See also Motorship, vol. 9, no. 8, Aug. 1924, pp. 576-578, 5 figs.; Mar. Eng. & Shipping Age, vol. 29, no. 9, Sept. 1924, pp. 522-523, 9 figs., and Mar. News, vol. 11, no. 4, Sept. 1924, pp. 116-118, 9 figs.

Diesel Engine vs. Steam. Oil-Engined versus Steam-Driven Tugs. Engineering, vol. 118, no. 3067, Oct. 10, 1924, pp. 517-518, 7 figs. partly on p. 520. Describes two motor tugs, Hurghada and Safaja, constructed for Egyptian Ports & Lighthouses Administration, which are provided with 6-cylinder Vickers-Petter heavy oil engines.

Diesel-Engined. Direct Drive Diesel in Ocean-Going Tug Jumbo. Motorship, vol. 9, no. 4, Apr. 1924, pp. 256-257, 2 figs. Equipped with single Nelseco Diesel engine which develops 600 b.hp. in six cylinders at 200 r.p.m. with stroke and bore dimensions of 16½ by 24 in.; length, 100 ft.; beam, 26 ft.

Reversible Diesel Engine Drives Stern Wheel Towboat. Mar. Eng., vol. 29, no. 4, Apr. 1924, pp. 241-242, 3 figs. Reliable, efficient and economical propulsion secured with reversible two-cycle solid-injection Diesel engines driving split stern wheel through chain sprocket and bevel gears.

Stern-Wheeler Reduces Fuel-Bill to One-Fourth. Motorship, vol. 9, no. 4, Apr. 1924, pp. 263-265, 5 figs. Harvey, a 113-ft. Mississippi River towboat, with pair of Worthington Diesel engines, runs successful trial, showing great savings over steamer.

Towing. See TOWING.

Towing Power. Measuring the Towing Power of Tugs, G. Kempf. Mar. Eng., vol. 29, no. 10, Oct. 1924, pp. 602-604, 2 figs. Pull determined by raising towing hawser definite amount at some point and weighing resulting vertical forces. Translated from Werft Reederei Hafen, May 7, 1924.

TUNGSTEN

Aluminum-Copper Alloy of. See ALUMINUM ALLOYS, Tungsten Alloyed to.

Chinese Deposits. Mining Tungsten Ore at Outposts of Steel, G. F. Creveling. Iron Trade Rev., vol. 74, no. 17, Apr. 24, 1924, pp. 1112-1115, 9 figs. Chinese deposits and industry; mining methods.

Metallic, Preparation of. The Preparation of Metallic Tungsten and Some of Its Alloys, L. Kahlenberg and H. H. Kahlenberg. Am. Electrochem. Soc.—Advance Paper no. 4, for meeting Oct. 2-4, 1924, pp. 51-61. Particulars of research based upon new discovery that tungsten trioxide and tungstic acid are soluble in fused alkali chlorides, and that from such fusions metallic tungsten and also alloys of tungsten may be prepared by electrolysis.

Plating Iron with. See ELECTROPLATING, Tungsten on Iron.

Sodium Tungstate from Wolframite. Continuous Process for Manufacture of Sodium Tungstate and Tungstic Acid from Wolframite, N. T. Gordon and A. F. Spring. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 555-562, 6 figs. Presents unified view of various operations emphasizing continuous production principle; fusion mixture is prepared from wolframite ore, conveyed automatically to rotary fusion furnace, and fused mass discharged continuously into lixiviating tank; sodium tungstate thus formed is separated from residue by rotary filter and used either for continuous precipitation of tungstic acid or preparation of sodium tungstate crystals.

Specific Heat. See METALS, Specific Heat.

Wire. See WIRE, Tungsten.

TUNGSTEN STEEL

Line of Solubility. See CHROME STEEL, Line of Solubility.

TUNING FORKS

Electrically Maintained. Electrically-Maintained Tuning Forks. Some Factors Affecting Frequency, A. B. Wood. Jl. Sci. Instruments, vol. 1, no. 11, Aug. 1924, pp. 330-339, 6 figs. Outline of various factors affecting frequency of electrically maintained tuning forks; importance of damping; effect of amplitude on frequency and influence of spring contacts; other factors. See also following contribution, entitled, Note on Electrically-Maintained Tuning-Forks, D. W. Dye, pp. 340-341.

TUNNELING

Big Creek, Cal. Tunneling Operations at Big Creek, Calif., E. D. Gardner. Eng. & Min. Jl.-Press, vol. 118, no. 23, Dec. 6, 1924, pp. 885-889, 10 figs. Describes tunneling operations which are being conducted by South. Cal. Edison Co. in developing hydroelectric power in Big Creek project on San Joaquin River in Sierra Nevada Mountains.

Coal-Mine. See COAL MINING, Tunneling.

Colorado Rockies. Country's Longest Tunnel Project Well Under Way. Ry. Rev., vol. 74, no. 4, Jan. 26, 1924, pp. 174-181, 16 figs. Construction details of Moffat tunnel, 6.09 miles long, through Colorado Rockies.

Hollywood-Glendale-San Fernando Valley. Tunnel Digging Is Begun in Los Angeles, C. A. Elliott. Elec. Ry. Jl., vol. 64, no. 10, Sept. 6, 1924, pp. 349-351, 5 figs. Describes proposed Hollywood-Glendale-San Fernando Valley tunnel in Los Angeles; will eliminate 1000 daily car movements from streets in congested district; approximate length 5025 ft.

Methods. Advantageous Practices in Tunneling, C. S. Hurter. Du Pont Explosives Service Bul., no. 10, Apr. 1924, 8 pp., 11 figs. Some practical ways of securing greater progress in tunnel operations and lower costs.

Moffat Tunnel, Colo. Driving the Moffat Tunnel, D. C. Deringer, Jr. Eng. & Min. Jl.-Press, vol. 118, no. 20, Nov. 15, 1924, pp. 765-769, 11 figs. Good organization and equipment expedite work in driving tunnel from Denver, Col., to Salt Lake City, Utah. Description of methods and equipment.

Work on Moffat Tunnel Now in Full Progress. Ry. Age, vol. 77, no. 20, Nov. 15, 1924, pp. 889-894, 11 figs. Completion of headings for nearly one-third of its total length of 6.1 mi.; how east headings are being driven; power equipment for mucking; problems presented by headings at west end.

Pipe Tunnel. Building a Pipe Tunnel Under the Indiana Harbor Canal. Contractors' & Engrs.' Monthly, vol. 7, no. 6, Dec. 1923, pp. 66-68, 2 figs. Describes new type of construction used in recently completed tunnel built for Sinclair Pipe Line Co. at East Chicago, Ind.; avoids earlier crossing difficulties.

Pit River, Cal. Tunneling in Volcanic Formations on Pit River Project. Eng. News-Rec., vol. 93, no. 5, July 31, 1924, pp. 168-171, 8 figs. Particulars of tunneling work in Pit River No. 3 tunnel now under construction by Pacific Gas & Elec. Co. in northern California. Wall plate drifts and top center headings used as rock varies from friable tuff to hard lava; air shovel with ½-cu. yd. bucket is preferred mucking method; bonus system increases progress.

Progress in. Progress in the Art of Tunneling, J. V. Davies. Eng. News-Rec., vol. 92, no. 16, Apr. 17, 1924, pp. 674-679, 14 figs. Review of development in art of tunnel construction during past 50 years.

Shandaken, N. Y. Shandaken—Longest Tunnel in World, F. Byrne. Am. Industries, vol. 24, no. 10, May 1924, pp. 11-13, 4 figs. Notes on boring of latest addition to great water system of New York. Accomplished by some of the speediest driving with explosives on record.

Steam-Shovel. See STEAM SHOVELS, Tunnel Mucking by.

Wet-Rock Tunnel. Driving a Long Small-Section Wet Rock Tunnel. Eng. News-Rec., vol. 93, no. 19, Nov. 6, 1924, pp. 744-747, 7 figs. Use of mucking machine enabled two 8-hour drilling shifts to be worked each day; Diesel-engine power for tunneling operations.

TUNNELS

Arthur's Pass, New Zealand. Arthur's Pass Tunnel in New Zealand Completed, F. W. Furkert. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924,

pp. 395-396, 3 figs. Tunnel 5.3 mi. long to connect east and west coasts of South Island; 3½-ft. gage; single track.

Blasting. See BLASTING, Tunnels.

Concrete Lining. Concrete Lining Methods in the Skagit Tunnel. Eng. News-Rec., vol. 93, no. 18, Oct. 30, 1924, pp. 700-701, 4 figs. Air gun built on job places 300 cu. yd. of concrete in 24 hours; traveler for trimming and setting forms.

Drainage. Drainage Tunnels Overcome Great Landslides. Ry. Age, vol. 77, no. 22, Nov. 29, 1924, pp. 975-978, 6 figs. See also Ry. Eng. & Maintenance, vol. 20, no. 12, Dec. 1924, pp. 476-479, 6 figs. Ore.-Wash. R. R. & Navigation Co. solves problem of moving mountain side on Columbia River line, 42 mi. east of Portland, Ore.; in all 8 tunnels have been constructed with aggregate length, including laterals, of 4674 ft.; results of work are quite satisfactory.

Earth Pressures. Earth Pressure on Linings of Galleries and Tunnels (Erdruck auf die Auskleidung in Stollen und Tunneln), H. Dörr. Bautechnik, vol. 2, no. 50, Nov. 21, 1924, pp. 563-567, 5 figs. Mathematical-geometric examination of most important stresses in ground with horizontal surface, assuming that ground above tunnel consists of loose rock without cohesion.

English Channel Project. The Channel Tunnel. Ry. Gaz., vol. 40, no. 12, Mar. 21, 1924, pp. 417-422. Particulars of project for construction of tunnel under Channel to connect England and France, given at meeting of House of Commons Committee; engineering details; proposed tunnel and existing railways; pilot heatings; safety of tunnel against bombs.

Enlargement, London Tube. Tunnel Enlargement on a London Tube Railway. Eng. News-Rec., vol. 93, no. 24, Dec. 11, 1924, p. 953, 1 fig. Annular shield takes slice around bore; lining reused with new segments; wet ground causes caving.

Intake, Mississippi River Levee. Intake Tunnel Through New Orleans Levee in Sheetpile Cofferdam, R. H. Chambers. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 560-562, 4 figs. Excavation in soft ground under hydrostatic heads up to 33 ft. in short sections within steel sheeting; close bracing required to prevent bulging; sheeting deflected by logs.

Lighting. See LIGHTING, Tunnels.

Lining under Traffic. Relining a Tunnel Without Interrupting Traffic, W. B. Snow. Tech. Eng. News, vol. 4, no. 7, Jan. 1924, pp. 253 and 288, 1 fig. Describes construction of an interior concrete lining in Coulter tunnel, northeast of Pittsburgh.

Submarine Oil-Pipe. Building a Small Submarine Oil Pipe Tunnel. Eng. News-Rec., vol. 92, no. 14, Apr. 3, 1924, pp. 574-576, 5 figs. Siphon pipe lines under canal by tunnel in stiff clay; construction methods; welded pipes rest on precast blocks.

Vehicular. Building the Hudson River Vehicle Tunnel. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, pp. 798-803, 8 figs. Seven shafts formed by sinking steel pneumatic caissons; five 29½-ft. shields drive twin tubes through silt and rock; work free from serious mishap.

Ventilation. Carbon Monoxide Under Traffic in Liberty Tunnels (Pittsburgh), A. C. Fieldner, W. P. Yant and L. L. Satler, Jr. Eng. News-Rec., vol. 93, no. 26, Dec. 25, 1924, pp. 1022-1024, 1 fig. Composition of tunnel air found to agree with that calculated from road test data obtained before construction; marked effect of air current induced by motion of vehicles.

Natural Ventilation in the Liberty Tunnels, A. C. Fieldner and W. P. Yant and L. L. Satler, Jr. Eng. News-Rec., vol. 93, no. 8, Aug. 21, 1924, pp. 290-291, 2 figs. Systematic observations of six months' use of one-mile vehicle tunnels without forced ventilation show normal condition satisfactory. Dangerous carbon monoxide concentration during traffic jam. Pub. by permission U. S. Bur. Mines.

Temperatures and Locomotive Gases in Tunnels, S. H. Katz and E. G. Meiter. Ry. Rev., vol. 75, no. 11, Sept. 13, 1924, pp. 391-396, 6 figs. Bur. of Mines investigates temperatures and composition of atmosphere in engine cabs while passing through tunnels.

Ventilating an 8,000-ft. Tunnel, W. R. Lindsay. Eng. & Min. Jl.-Press, vol. 118, no. 4, July 26, 1924, pp. 139-140, 1 fig. Describes method of ventilating no. 10 level adit of Engels mine of Engels Copper Mining Co.

Ventilation Progress on New York-New Jersey Vehicular Tunnel. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 4, Apr. 1924, pp. 327-334, 4 figs. Describes tests conducted to determine several problems that have developed during work.

TURBINES

Gas. See GAS TURBINES.

Hydraulic. See HYDRAULIC TURBINES.

Mercury. See BOILERS, Mercury-Vapor; STEAM, Binary Cycles Using Mercury and Steam.

Oil. See GAS TURBINES.

Steam. See STEAM TURBINES.

TURBO-ALTERNATORS

Design. Alternating-Current Turbo-Generators (Wechselstrom-Turbogeneratoren), A. Zehrung. Praktische Maschinen-Konstrukteur, vol. 57, no. 25, July 8, 1924, pp. 352-357, 12 figs. Design and construction of S S W type.

Hungarian Practice in High Speed Turbo-Alternator Design, E. Wilczek. Engineering, vol. 118, no. 3058, Aug. 8, 1924, pp. 206-207, 10 figs. Details of methods adopted in high-speed design, by O. T. Blathy, including two and four pole rotors, stator-winding and bracing arrangement, ventilation and efficiency. Abstract of paper read before World Power Conference.

Heat Dissipation in. The Dissipation of Heat in Turbo-Generators, C. Sylvester. Elec. Times, vol. 66, no. 1723, Oct. 23, 1924, pp. 475-476, 5 figs. Describes tests carried out by author on 6000-kw. turbo-generator in large central station, using method of decreasing alternator rotor temperature by passing oil through main turbo-generator bearings at lower temperature than would exist when machine is running under normal conditions.

Iron Losses. Iron Losses Through Simultaneous Magnetization at Two Different Frequencies (Eisenverluste durch gleichzeitige Magnetisierung bei zwei verschiedenen Frequenzen), F. Schröter. Archiv für Elektrotechnik, vol. 13, no. 1, Mar. 31, 1924, pp. 30-34, 7 figs. See also Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt, vol. 7, no. 2, 1924, pp. 210-214, 7 figs. Measurement of iron losses occurring with simultaneous magnetization through two alternating currents of different frequency; it is shown that entire iron loss is many times greater than losses with purely sinusoidal magnetization with basic frequency and uniform maximum induction; herewith an idea is obtained of magnitude of iron losses in generator teeth.

Large. Large Alternators. A. B. Field. Engineering, vol. 118, no. 3068, Oct. 17, 1924, pp. 565-566. Deals with reliability, operating cost, and operating convenience. (Abridgement.) Paper read before World Power Conference.

Large Steam Turbine Generators, W. J. Foster, E. H. Freiburghouse and M. A. Savage. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924,

pp. 923-931, 13 figs. Discusses manufacture, touching on what is considered best practices of present day; describes 62,500-kva. 60-cycle generator and gives test data; losses and ventilation problems; probable sizes at given speeds which may be expected in future.

Niagara Falls. World's Largest Hydro Unit, M. C. Olson and E. B. Plenge. Elec. Wld., vol. 83, no. 4, Jan. 26, 1924, pp. 174-177, 6 figs. Describes Niagara Falls Power Co.'s new turbo-generator, rated at 65,000 kva.; weight is 1,500,000 lb.; driven by a 70,000-hp. hydraulic turbine under an effective head of 213.5 ft.

Standardization. Standardization of Turbo-Alternators of 50 Periods per Second and 1500 to 3000 R.P.M. with Direct Drive (Normalisation des groupes turboalternateurs à 50 périodes par seconde à 1500 et 3000 tours par minute à commande directe). Revue Générale de l'Electricité, vol. 15, no. 6, Feb. 9, 1924, pp. 226-229. Revised text of code adopted by Comité de l'Union des Syndicats de l'Electricité; definitions and standard specifications; standard rules for operation and testing of generators and their exciters coupled with steam turbines.

Tests. Turbo-Alternator Tests, John Bruce. Elec. Rev., vol. 94, no. 2406, Jan. 4, 1924, pp. 4-6, 7 figs. Résumé of methods of making principal measurements and apparatus used in official and routine testing of turbo-alternator units, in case of large electricity supply undertaking.

Ventilation. An Experimental Study of Ventilation of Turbo Alternators, C. J. Fechheimer. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 416-423, 11 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1202-1206, 3 figs. End bell and pressure measurements; diverging intake to end bells; volume measurement and distribution; systems of ventilation; construction of turbo models; test results. (Abridged.)

The Multiple-Path Radial Ventilation of Large Turbo-Alternators, M. D. Ross. Elec. Jl., vol. 21, no. 12, Dec. 1924, p. 540-545, 10 figs. Description of multiple-radial system and its advantages; limitations of other ventilating schemes.

TURBO-GENERATORS

[See also TURBO-ALTERNATORS.]

Air Coolers for. Practical Results with Air Coolers for Turbo-Generators (Betriebsergebnisse mit Luftkühlern für Turbodynamos), W. Bedur and E. Stach. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 7, Feb. 16, 1924, pp. 155-157, 11 figs. Based on tests, authors point out advantages of closed air-cooling method over open air cooling heretofore used for current generators and closed electric motors; safety measures in case of interruption of fresh-water supply; the GEA air cooler and its advantages; American types.

British Empire Exhibition. Turbo-Generators at Wembley, M. Walker. Electrician, vol. 93, no. 2422, Oct. 17, 1924, pp. 432-435, 10 figs. Increase in size of high-speed units; English Electric features; British Thompson-Houston improvements.

Brush-Ljungström. Heavy Current Turbo-Generators. Electrician, vol. 92, no. 2399, May 9, 1924, pp. 570 and 573, 2 figs. Description of a new Brush-Ljungström machine.

See also CENTRAL STATIONS, St. Pancras, London.

Cooling. The Multiple-Radial System of Cooling Large Turbo-Generators, D. Brass. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 3, Mar. 1924, pp. 185-193, 7 figs.; and (discussion) in vol. 43, no. 12, Dec. 1924, pp. 1202-1206, 3 figs. Discusses theoretical basis of special turbo-generator ventilation system, in which cooling air divides into several branches, and passes through stator core radially in and out; analysis of fundamental questions in regard to flow of air in any ventilation system; numerical example is worked out to show application of derived formulas.

Economical Loading. Economical Loading of Turbo-Generator Units, M. K. Drewry. Power Plant Eng., vol. 28, no. 17, Sept. 1, 1924, pp. 887-888, 3 figs. Pronounced turbine characteristics definitely determine most efficient operation of several units.

Manufacture. Extreme Variety Versus Standardization, J. H. Van Deventer. Indus. Mgmt. (N. Y.), vol. 67, no. 1, Jan. 1924, pp. 36-46, 11 figs. Turbine-generator production at Gen. Electric Co.'s plant at Schenectady.

Rotors, Shrinking on Shaft. See RINGS, Steel, Shrinking on.

Testing. The Testing of Turbo-Generating and Turbo-Compressing Plant, W. H. Badger. S. African Inst. Elec Engrs.—Trans., vol. 14, part 2, Nov. 1923, pp. 200-237, 20 figs. Measurement of head, rate of flow, and electrical output; turbines on system and precautions necessary when testing; Willans' line; application of nozzle discharge calculations, vacuum temperature; superheat and pressure corrections; aberration of turbines; supersaturation of steam; turbine maintenance; etc.

30,000-Kw. 30,000-K.W. Steam Turbo-Generator at Rothernam. Engineering, vol. 117, nos. 3029 and 3031, Jan. 18 and Feb. 1, 1924, pp. 65-67 and 134-136, 49 figs. partly on supp. plates. Machine is largest yet constructed in England, and one of largest in world to develop its power in single casing; built by Brit. Thomson-Houston Co. and is of their multi-stage impulse type.

1200-Lb.-Pressure. Operation of 1200-Lb. Pressure Generating Unit at the Weymouth Power Station, Edison Electric Illuminating Co., Boston, E. W. Norris. Gen. Elec. Rev., vol. 27, no. 11, Nov. 1924, pp. 714-718, 3 figs. Describes turbine generator which will be first of so high a pressure to be placed in commercial service in United States; its unique thermodynamic features and its operation under both normal and emergency conditions.

12,000-Kw. 12,000-KW. Steam Turbo-Generator at the British Empire Exhibition. Engineering, vol. 117, no. 3049, June 6, 1924, pp. 721-723, 22 figs. partly on supp. plate. Type of machine built for Colenso power station of S. African Railways and Harbors Administration, by C. A. Parsons & Co., Newcastle.

See also ELECTRICAL MACHINERY, British Empire Exhibition.

Westport Station, Baltimore. Turbine Packing, Bleeding Arrangements and Other Features of Westport Station Addition. Power, vol. 60, no. 16, Oct. 14, 1924, pp. 605-608, 3 figs. Describes special type of high-pressure packing gland, use of vertical hairpin tube heaters with special check valves and d.c. ball-bearing electrical auxiliaries, which are features of two newly installed 20,000-kw. turbo-generators ordered from Gen. Elec. Co. to replace four engine-driven 2000-kw. generators.

TURNTABLES. See ENGINEHOUSES, Turntables; RAILWAY TRACK, Turntables.

TYPEWRITERS

Heat Treating of Parts. Typewriter Parts Carefully Heat Treated and Colored. Fuels & Furnaces, vol. 2, no. 5, May 1924, pp. 461-464, 3 figs. Method of treating machined parts, such as type bars, slide rail on which carriage rides, small pins, springs, etc., at Royal Typewriter Co., Hartford, Conn.

U

UMBRASCOPE. See GLASS, Surface Irregularities.

UNEMPLOYMENT

Business Cycles and. Business Cycles and Unemployment, W. E. Hotchkiss. Taylor Soc.—Bul., vol. 9, no. 2, Apr. 1924, pp. 86-89. Study of cycle and of measures taken by various firms to avoid its influence.

Insurance. Industrial Unemployment Insurance, S. B. Ackerman. Mgmt. & Administration, vol. 8, no. 6, Dec. 1924, pp. 647-649. Problems affecting its operation.

Prevention. Prevention of Unemployment with Special Reference to Great Britain. Int. Labour Rev., vol. 10, no. 4, Oct. 1924, pp. 653-664. Study of efforts of statemen, industrialists, and financiers in Britain to cope with evil which has afflicted their country for four years.

Problems. The Unemployment Problem, E. D. Sebring. Taylor Soc.—Bul., vol. 9, no. 4, Aug. 1924, pp. 177-185. Discusses causes, extent, and remedies; unemployment relief schemes and legislation.

Seasonal. The Problem of Seasonal Unemployment in the Building Industry, Wm. S. Parker. Int. Labour Rev., vol. 9, no. 3, Mar. 1924, pp. 361-371. Indicates economic and civic waste involved in leaving building labor idle for several months in year and considers chief causes of seasonal unemployment.

UNLOADING MACHINERY

[See also CRANES, Bridges; ORE HANDLING, Unloaders.]

Modern Types. Modern Construction of Grabs for Unloading (Neuzeitige Bauarten von Verladegreifern), R. Hänchen. Praktische Maschinen-Konstrukteur, vol. 57, no. 31, Aug. 19, 1924, pp. 429-434, 16 figs. Discusses new types of automatic grabs for bulk goods with regard to form, operation, and efficiency.

U. S. BUREAU OF STANDARDS

Division of Simplified Practice. How the Division of Simplified Practice Plans Conferences with Organized Trade Bodies, C. L. Barnum. Taylor Soc.—Bul., vol. 9, no. 5, Oct. 1924, pp. 203-224. Instructions of procedure of Division of Simplified Practice, Bur. of Standards, object of which is to secure reduction in variety of forms, sizes, etc., of products of an industry through voluntary agreement by those in the industry; instructions as printed reproduce so far as possible form of typewritten instructions, and is that part of procedure which has to do with meetings and conferences.

URANIUM

Carnotite. See CARNOTITE, Uranium Determination in.

V

VACUUM

High, Research in. The Vacuum—There's Something in It, W. R. Whitney. Gen. Elec. Rev., vol. 27, no. 7, July 1924, pp. 430-439, 11 figs. Summary of results of research in field of high vacuum. From address before Am. Assn. for Advancement of Sci.

VACUUM CLEANERS

Gas-Operated. See GAS, Vacuum Cleaning Machines, Use for.

VACUUM PUMPS. See PUMPS, Vacuum.

VACUUM TUBES

Amplifiers. On the Voltage Amplification Ratio of the Triode Valve Resistance Amplifier, H. Nukiyama and T. Kuwashima. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. of Japan), no. 424, Nov. 1923, pp. 859-869, 14 figs. Voltage amplification ratio of triode valve resistance amplifier is measured in audio frequency range by means of an a. c. potentiometer. Relation between amplification ratio and resistance in plate circuit and amplitude of impressed alternating voltage at grid is studied experimentally. (In Japanese.)

Automobile-Engine Ignition. See IGNITION, Automobile-Engine.

Canal Rays. Photographic Action of Canal Rays (Ueber die photographische Wirkung der Kanalstrahlen), M. Jakobson. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 326-338, 6 figs. Apparatus employed, with diagram showing most important part of final research arrangements; photographic material and its method of action; separation of direct action of canal rays from influence of light sent out by them; character of photographic influence of canal rays.

Cathode Rays, Velocity of. Experimental Determination of the Velocity of Cathode Rays (Détermination expérimentale de la vitesse des rayons cathodiques), F. Dacos. Assn. des Ingénieurs Electriciens Sortis de l'Institut Electrotechnique Montefiore—Bul., vol. 2, no. 3, Mar. 1924, pp. 105-115, 6 figs. Principle and modification of method; calculation of error; verification of method.

Electron Tubes. See ELECTRON TUBES.

Four-Electrode. The Marconi Four-Electrode Tube and Its Circuit, H. de A. Donisthorpe. Inst. of Radio Engrs.—Proc., vol. 12, no. 4, Aug. 1924, pp. 411-421, 9 figs. Divides quadrodes into (1) tubes with two grids in addition to filament and anode, (2) tubes with two anodes in addition to filament and grid, (3) tubes with three anodes in addition to filament, two of electrodes in every case functioning as controlling elements.

Holweck Valve. The Holweck Valve. Wireless World, vol. 13, no. 15, Jan. 9, 1924, pp. 458-461, 5 figs. Construction of this valve, which is a new departure in high-power transmitting triodes; brief description of operation of special apparatus used in conjunction with it.

Manufacture. Making Wireless Valves. Eng. Production, vol. 7, no. 140, May 1924, pp. 130-133, 16 figs. Interesting operations on intricate work at Cossor Co.'s plant in London, Eng.

Overvoltages, Measurement of. Electric Valve Tubes for the Measurement fo Overvoltages (Die elektrische Ventilröhre als Gerät zur Messung von Ueberspannungen), M. Schenkel. Elektrotechnische Zeit., vol. 45, no. 20, May 15, 1924, pp. 490-492, 4 figs. Investigation of adaptability of modern high-vacuum valve tubes with glow cathode and pure electronic discharge for measurement of overvoltages of lines or windings.

Push-Pull Circuit. A High Efficiency Vacuum Tube Oscillating Circuit, D. C. Prince and F. B. Vogdes. Inst. Radio Engrs.—Proc., vol. 12, no. 5,

Oct. 1924, pp. 623-650, 17 figs. Describes modified push-pull circuit in which approximately square waves of current are passed through two tubes alternately; high efficiency is obtained by superimposing upon grid circuit a voltage porportional to current variations in plate circuit.

Regenerative Effect. The Limit of Regeneration, N. C. Little. Inst. Radio Engrs.—Proc., vol. 12, no. 4, Aug. 1924, pp. 479-483. Shows that at limit of regeneration relative magnitude of received signal in plate circuit to that impressed on grid is universely proportional to latter.

Thermionic Currents in. Thermionic Currents in Vacuum Tubes and How to Affect Them Electrically and Magnetically (Ueber die in Vakuumlampen auftretenden Thermionenströme und deren elektrische und magnetische Beeinflussung), P. Selényi. Zeit. für technische Physik, vol. 5, no. 9, 1924, pp. 412-418, 1 fig. Results of experiments.

Thermionic Valves. Marconi-Osram Thermionic Valves. Elec. Rev., vol. 95, no. 2445, Oct. 3, 1924, pp. 498-499, 5 figs. Methods of manufacture. See also description in Elecn., vol. 93, no. 2419, Sept. 26, 1924, pp. 350-351, 5 figs.

Some Applications of the Thermionic Electric Triode to Purposes Other Than Radio Communication, H. A. Thomas. Experimental Wireless, vol. 1, no. 11, Aug. 1924, pp. 636-642, 15 figs. Describes numerous applications of thermionic triode for electrical measurements. Gives results of experiments demonstrating that scope of instrument is not limited to radio communication.

The Principles Underlying the Operation of the Thermionic Valve, S. Barrell. Wireless World, vol. 13, nos. 16 and 17, Jan. 16 and 23, 1924, pp. 491-493 and 528-530, 7 figs. Discusses operating features and phenomena associated with thermionic valve, with view to indicating some of its constants and how they are controlled.

The Utility of Thermionic Valve Characteristics, H. J. B. Chapple. Experimental Wireless, vol. 1, no. 9, June 1924, pp. 503-507, 6 figs. Gives methods for determination of valve characteristics and explanation of various constants and their use.

Thermionic Valves With Dull-Emitting Filaments. Instn. Elec. Engrs.—Jl., vol. 62, no. 332, Aug. 1924, pp. 689-696 and (discussion) 696-700, 6 figs. History of dull-emitting thoriated tungsten filament and development of thermionic valves containing these filaments. Describes and discusses intrinsic properties.

Valve Manufacture, W. J. Jones. Experimental Wireless, vol. 1, no. 9, June 1924, pp. 508-512, 7 figs. Describes British methods employed in manufacture of valves; considers construction of bright-filament valve with tungsten filament as is used in manufacture of incandescent lamps.

Three-Electrode. Alkali Vapor Detector Tubes, Hugh A. Brown and Chas. T. Knipp. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 1, Jan. 1924, pp. 26-32, 17 figs. Describes unusual and very desirable results obtained on priming tungsten filament three-electrode vacuum tubes with alloy of potassium and sodium when such tubes are used as detectors of radio-frequency currents in receiving circuits.

Ballistic Measurements on Triodes (Misure balistiche sui triodi), B. Del Nunzio. Elettrotecnica, vol. 11, no. 18, June 25, 1924, pp. 413-418, 14 figs. Describes method for measuring coefficient of internal amplification.

Contribution to the Study of Thermionic Valves (Contribution à l'étude des valves thermoioniques), H. Pècheux. Revue Générale de l'Electricité, vol. 16, no. 4, July 26, 1924, pp. 139-142, 3 figs. Compares types of triode lamps used in radio industry, characteristics of filaments and grids; shows superiority of new type of valve with low consumption as detector and amplifier.

Phenomenon of Spatial Charging of Oxide Cathode Lamps (Ueber Raumladungserscheinungen an Oxydkathoden-Lampen), A. Katsch. Zeit. für technische Physik, vol. 5, no. 11, 1924, pp. 505-511, 11 figs. Results of experiments to explain different behavior of triode lamps with normal tungsten cathodes and of those with oxide cathodes.

See also Triode.

Transmitting and Rectifying Valves. High-Tension Rectifying and Transmitting Valves. Engineering, vol. 118, no. 3066, Oct. 3, 1924, pp. 492-494, 8 figs. Deals with latest developments in application of thermionic valve as transmitting valve and high-tension rectifying valve.

Triode. An Analysis of Two Triode Circuits, J. H. Morecroft. Inst. Radio Engrs.—Proc., vol. 12, no. 5, Oct. 1924, pp. 579-603 and (discussion) 604-607, 19 figs. Two typical triode circuits, used for obtaining regeneration by mutual induction, are examined analytically, with idea of testing results of analysis by experiments; measurements made on circuits, by using a.c. bridge, confirm theoretically derived relations to remarkable degree of precision, showing that triode circuits are susceptible of accurate analysis.

Experimental Determination of the Fundamental Dynamic Characteristics of a Triode, E. Takagishi. Inst. Radio Engrs.—Proc., vol. 12, no. 5, Oct. 1924, pp. 609-622, 10 figs. By picking out fundamental component only from distorted current in triode while functioning, writer has found first new forms of dynamic characteristics for a triode, which are utilizable for solving various problems not hitherto satisfactorily solved (for example, modulation in radiotelephony, phenomenon of "ziehen" or "pulling," etc.); experiments relative to voltage amplification factor for which new expression has been found.

The Characteristic Surface of the Triode, J. R. Tolmie. Inst. Radio Engrs.—Proc., vol. 12, no. 2, Apr. 1924, pp. 177-191, 8 figs. Method of representing triode characteristics by means of surfaces rather than by families of characteristic curves; describes physical features of surfaces and derives fundamental equation for alternating component of plate current for ideal surface; action of triode both as simple and as regenerative amplifier, with reference to its characteristic surface, is described.

See also Three-Electrode.

VALUATION

Coal Mines. See COAL MINES, Valuation.

Gas Works. See GAS, Rate Making.

Mines. See MINES, Valuation.

Public Utilities. See PUBLIC UTILITIES, Properties Valuation.

Railway. See RAILWAYS, Valuation.

VALVE GEARS

Lentz. Curve of Normal Path of the Lentz Oscillating Cam Gear (Eine Normal-Wegkurve zur Lentz-Schwingdaumensteuerung), H. Faik. Hanomag-Nachrichten, vol. 11, no. 129-130, July-Aug. 1924, pp. 126-133, 4 figs. Graphic determination of curve of path, effect on acceleration curve, valve dimensions in relation to curve of path, determination of spring power required.

Steam Distribution by Means of Lentz Valve Gear (Stoomverdeeling door middel van Lentzkleppen), F. Muller. Ingenieur, vol. 39, no. 32, Aug. 9, 1924, pp. 595-602, 16 figs. Describes Lentz system of steam valve gear and governor, and their application to compound locomobiles and ship-propulsion machinery.

Locomotive. See LOCOMOTIVES, Valve Gears.

Proell Slide-Valve. Positive Piston Slide-Valve Gear, Proell Patent (Zwangläufige Kolbenventilsteuerung Patent Proell), F. Lehmann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 24, June 14, 1924, pp. 625-628, 16 figs. Detailed description; results of steam consumption tests with 1000-hp steam engine fitted with new gear.

Transmission Effects. Transmission Effects of a Multiple-Link Valve Gear (Uebersetzungswirkungen eines mehrgliedrigen Getriebes), R. Doerfel. Maschinenbau, vol. 3, no. 8, Jan. 24, 1924, pp. 193-197, 9 figs. Investigation of admission valve gear of uniflow engine and determination of dimensions of valve-gear rods.

VALVES

Automatic-Machinery. Valve Mechanisms in Automatic Machinery, A. A. Dowd. Machy. (N. Y.), vol. 31, no. 2, Oct. 1924, pp. 126-129, 5 figs. Describes devices for handling semi-fluid, heavy-liquid, heavy-pasty, and heavy-sticky materials.

Butterfly. New Type of Butterfly Valves Used on Davis Bridge Hydro-Electric Project. Power, vol. 60, no. 10, Sept. 2, 1924, pp. 358-359, 3 figs. Describes improved type of butterfly valve, known as Dow disk-arm pivot valve, which has been extensively used on New England Power Co.'s Davis Bridge project. Represents an attempt to retain simplicity and moderate cost of usual type of butterfly valve and at same time provide an operating mechanism of such type and rigidness as to increase reliability and reduce leakage.

Gas-Fired-Apparatus Control. A New Thermostatic Gas-Valve for High Temperatures from 500° Fahr. Upwards. Gas. Jl., vol. 166, no. 3185, May 28, 1924, pp. 598-599, 3 figs. Description of a thermostatic gas-valve especially applicable to control of melting pots for printers' metal, including monotype, linotype, and stereotype, die-casters' metals, lead presses, tinning baths, tempering and annealing furnaces, aluminum and brass furnaces, etc.

Materials, Tests of. Tests on Valve Materials Made Under Working Conditions. Automotive Industries, vol. 51, no. 2, July 10, 1924, pp. 110-112, 1 fig. Results of tests of poppet-type valves for airdraft engines, made of different materials, described in paper presented to Am. Soc. for Testing Matls. at Atlantic City by J. B. Johnson and S. A. Christianson.

Pressure-Reducing. Selection of Reducing Valves (Ueber die Auswahl der Reduzierventile), A. Eigenmann. Gesundheits-Ingenieur, vol. 47, no. 38, Sept. 16, 1924, pp. 448-450, 4 figs. Discusses kinds of valves available, and calculation of reducing valves; gives table for graphic determination, and examples.

See also HEATING, STEAM, Pressure Regulators.

Remote Control. See LOCKS, Remote Control of Valves and Gates.

Steel-Casting. See STEEL CASTINGS, Valves.

Superheated-Steam and High-Pressure. Modern Superheated-Steam and High-Pressure Valves (Neuere Heissdampf- und Hochdruckschieber), G. W. Koehler. Zeit. des Vereines deutscher Ingenieure, vol. 68, nos. 5 and 19, Feb. 2 and May 10, 1924, pp. 95-100 and 468, 25 figs. Feb. 2: Deals with valves with simple and with two parallel seats and emphasizes advantage of auxiliary valve, which is automatically set in action by tightening of valve stem; deals also with flap valves, and points out their advantages. May 10: Improved designs.

Zeuner Valve Diagram. See STEAM ENGINES, Admission and Exhaust in.

VANADIUM

Extraction from Vanadiferous Sandstones. Extraction of Vanadium From Vanadiferous Sandstones, H. A. Doerner. Chem. & Met. Eng., vol. 31, no. 11, Sept. 15, 1924, p. 429. Preliminary results of attempts to treat sandstone ores of Garfield County, Colorado. Pub. with permission U. S. Bur. Mines.

Iron Ore. See IRON ORE, Vanadium in.

Mineral. See MINERALS, Sincosite.

Spectrum. See SPECTRA, Vanadium.

Structure of. The Structure of Vanadium, H. Collins. Chem. News, vol. 128, no. 3331, Feb. 15, 1924, pp. 100-102. Facts and experimental results demonstrating that an atom of vanadium has been formed by union of an atom of magnesium with one of aluminum.

Uses. Vanadium and Its Uses. Chem. Trade Jl., vol. 74, no. 1916, Feb. 8, 1924, pp. 158-159. Preparation and properties, principal ores, metallurgy, chemical and metallurgical uses; Peru chief source of supply.

VAPORS

Adsorption by Charcoal. The Adsorption of Vapors by Charcoal, A. S. Coolidge. Am. Chem. Soc.—Jl., vol. 46, no. 3, Mar. 1924, pp. 596-627, 22 figs. Discusses conditions under which reliable adsorption measurements can be made; standard adsorbent is defined, and adsorption of 9 vapors determined over range of temperatures from 0 to 300 deg. and of pressures from 0.0002 mm. to 1000 mm.

Metal. Critical Temperature in the Condensation of Metal Vapors (Ueber die kritische Temperatur bei der Kondensation von Metalldämpfen), J. Chariton and N. Semenoff. Zeit für Physik, vol. 25, no. 4-6, Aug. 4, 1924, pp. 287-291, 4 figs. Works out method for measuring critical temperature in condensation of metal vapors on various surfaces, shows that critical temperature depends on kind of surface and on vapor density.

Pressures. Equations of Tensions of Liquid-Vapor Mixtures of Several Elements and Their Application to Air (Die Spannungsgleichungen von mehrstoffigen Flüssigkeits-Dampfgemischen und ihre Anwendung auf Luft), V. Fischer. Zeit. für technische Physik, vol. 5, no. 10, 1924, pp. 458-468, 3 figs. Determination of composition of liquid and vapor from vapor pressure equations; formulates vapor pressure equations for a mixture of any number of elements.

Graphical Vapor Pressure and Specific Gravity Tables, H. G. Deming. Indus. & Eng. Chem., vol. 16, no. 6, June 1924, pp. 614-615, 3 figs. Tables present information commonly given in 40 or 50 pages of print in very much condensed form, and offer advantage of instant visual interpolation between values given in ordinary tables.

Vapor Pressure Curves for Systems Containing Alcohol, Ether, and Water, E. A. Louder, T. R. Briggs and A. W. Browne. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 932-935, 4 figs. Apparatus for determining vapor pressure; determination of vapor pressures of certain mixtures; from data obtained pressure-temperature curves have been constructed.

Salt Solutions, Temperature of. Temperature of the Vapor Above Boiling Salt Solutions, K. Schreber. Chem. & Met. Eng., vol. 31, no. 8, Aug. 25, 1924, pp. 297-299, 1 fig. An abstracted translation of article in Chemische Apparatur, 1923, dealing with experiments on temperature of evolved vapors.

Specific Volumes. Vapor Densities of Benzol, Toluene, Phenol, and the Creosols (Spezifische Gewichte von Benzol-, Toluol-, Phenol- und

Kresoldämpfen), Fr. Bürk. Gas- u. Wasserfach, vol. 67, no. 35, Aug. 30, 1924, pp. 523-524. Values of vapor density and corresponding specific volume over wide range of temperatures and pressures are tabulated; they are of sufficient accuracy to be of service in design of chemical plant.

Superheated, Specific Heat of. Specific Heat of Superheated Vapors (Ueber die spezifische Wärme von überhitzten Dämpfen), R. Plank. Zent. für technische Physik, vol. 5, no. 9, 1924, pp. 397-404. Critical examination of empirical equations for specific heat of superheated vapors. Proposes new equation in their place.

Water, Discharge Tension in. Discharge Tension in Water Vapor (Entladungsspannungen in Wasserdampf), I. Strohhäcker. Zeit. für Physik, vol. 27, no. 1, Aug. 28, 1924, pp. 83-88, 4 figs. Describes experimental arrangement in which spark path between ball terminals is shielded from disturbing influences, and by its means spark tension in pure unsaturated water vapor and in very dry air is determined; in order that phenomena may be easily reproducible it is essential that electrode surfaces shall be absolutely free from oil.

Water, Formulas for. New Water-Vapor Formulas (Neue Wasserdampfformeln), M. Seiliger. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 49, Dec. 6, 1924, pp. 1263-1270, 8 figs. In the investigation of polytropic curves it is shown that neither the adiabates of semi-ideal gases nor the adbiabates of superheated water vapor can be represented by polytropes; the Callender polytrope is therefore only an approximate adiabate; for calculation of correct water-vapor adiabates, new equations for specific heat with constant pressure and for heat content are derived, and new formulas of the adiabates, entropy, etc.

Water, Viscosity. An Experimental Study of the Viscous Properties of Water Vapour, C. J. Smith. Roy. Soc.—Proc., vol. 106, no. A735, July 1, 1924, pp. 83-96, 4 figs. Experiments with water vapor at comparatively low pressure and temperatures of 100 to 260 deg. cent. show that viscosity is independent of pressure.

VARNISHES

Automobile. Some Attempts to Obtain More Durable Automobile Finishes, H. C. Mougey. Paint Manufacturers' Assn. of U. S., Sci. Sec., circular no. 207, July 1924, 36-46, 5 figs. Discusses black baking enamel system and color-rubbing and finishing varnish system, cellulose nitrate materials, and tests carried out.

The New Pyroxylin Automobile Finish, S. D. Kirkpatrick. Chem. & Met. Eng., vol. 31, no. 5, Aug. 4, 1924, pp. 178-182, 11 figs. Describes air-drying finish as durable as enamel and of sufficiently low viscosity to be applied with pneumatic spray; a hard, glass-like surface applied at minimum cost of labor, time and equipment.

Cellulose. See AIRCRAFT CONSTRUCTION MATERIALS, Cellulose Varnish.

Gums, Examination of. Microscopic Examination of Varnish Gums (Examen microscopique des gommes à vernis), P. Nicolardot and Ch. Coffignier. Chimie & Industrie, vol. 11, no. 3, Mar. 1924, pp. 456-468, 55 figs. Through microscopic study of gums it was possible to explain difference of hardness between the different groups and to ascertain why certain gums are friable.

Varnishes in the Electrical Industry, R. T. Fleming and A. F. Steel. Wld. Power, vol. 1, nos. 3 and 4, Mar. and Apr. 1924, pp. 149-157 and 234-240, 6 figs. Mar.: Classification of varnishes; raw materials employed in manufacture of insulating varnishes; manufacture of varnishes; processes. Apr.: Finishing and bonding varnishes; tests on insulating varnishes.

See also Synthetic; INSULATING MATERIALS, ELECTRIC, Varnishes and Compounds.

Photomicroscopic Record of Exposures. Photomicroscopic Record of Varnish Exposures, H. A. Gardner. Paint Mfrs.' Assn. of U. S.—Sci. Section, no. 204, June 1924, 11 pp., 17 figs. Presents photomicrographs that illustrate permanent records that may be made from month to month as deterioration proceeds.

Synthetic. Characteristics of Synthetic Varnishes (Caractéristiques des laques synthétiques), R. van Muyden. Revue Industrielle, vol. 54, no. 3184, Nov. 1924, pp. 353-361, 11 figs. General notes on synthetic rubbers; manufacture; properties; applications, particularly in electrical insulation; advantages of electrical material impregnated with synthetic varnish known as "Isolemail," and mechanical advantages of synthetic varnishes.

Tests. Physical Tests on Some Commercial Varnishes, H. A. Gardner and H. C. Parks. Paint Mfr.'s Assn. of U. S., Sci. Sec.—circular no. 210, Aug. 1924, pp. 69-77. Discusses method of examination, color, viscosity, drying time, hot and cold water tests, alkali and gas tests, kauri reduction test and permeability.

Varnish Studies Relationships of Physical Tests and Chemical Composition to Durability, W. T. Pearce. Paint Mfr.'s Assn. of U. S., Sci. Sec.—Special Circular, July 1924, 11 pp. 2 figs. Results of laboratory and exposure tests showing relationship of kauri reduction values to durability; composition to durability; and dauri reduction values to composition, etc.

Tung-Oil. The Alkali Increase Test for Tung Oil Varnishes, H. A. Gardner and C. P. Holdt. Paint Manufacturers' Assn. of U. S., Sci. Sec.—circular no. 206, June 1924, pp. 25-34. Discusses application of alkali increase test to commercial varnishes, and accuracy of these tests.

VENTILATION

Air Cleaning. See AIR, Dustiness Measurement.

Air-Duct Calculations. Cold Air Ventilating Ducts, H. J. Macintire. Southern Engr., vol. 41, no. 3, May 1924, pp. 4749, 3 figs. Determining friction heat due to flow of air in ducts, and methods of designing air-duct systems.

Duct Work in Connection with Ventilation, C. W. Kimball. Architectural Forum, vol. 41, no. 1, July 1924, pp. 33-35. Describes duct system and different materials used.

Air Leakage in Buildings. Air Leakage Through the Openings in Buildings, F. C. Houghten. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 2, Feb. 1924, pp. 121-134, 11 figs. Method employed in investigation of double hung windows, 2 ft. 8 in. by 5 ft. 2 in. by 1⅝ in., in a 13-in. brick wall, plastered on inside with cement plaster; results are given for leakage through such a window without weatherstripping and with two types of weather stripping, around frame and through brick wall itself.

Buildings. Ventilating Buildings on the Economizer Plan, T. N. Thomson. Plumbers Trade Jl., vol. 77, no. 2, July 15, 1924, pp. 140-144, 3 figs. Study of new method of ventilating buildings both winter and summer, using heat economies to cut down cost of ventilation.

Cars, Passenger. See CARS, PASSENGER, Ventilation.

Coal Mines. See COAL MINES, Ventilation.

Code. See HEATING AND VENTILATION, Code.

Cooling Effect on Human Beings. See HEALTH, Physiological Reactions to Air Cooling.

Department Stores. Problems in Ventilation of Department Stores, A. M. Feldman. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 30, no. 1, Jan. 1924, pp. 24-28, 2 figs. System designed by author for ventilating ground floor of a large department store so as not only to provide an ample supply of fresh air large enough for an unlimited number of customers and sales force, but also to eliminate all danger of drafts.

Electrical Machinery. See ELECTRICAL MACHINERY, Ventilation.

Farm Buildings. Recent Tests of Ventilation Systems in Farm Buildings, M. A. R. Kelley. Agricultural Eng., vol. 5, no. 1, Jan. 1924, pp. 7-8. Tests planned so as to study effect of temperature, humidity and animal heat to make observations of several construction factors.

Foundries. Ventilation of Foundries (L'Aération des Fonderies), A. Chanard. Fondrie Moderne, vol. 18, July 1924, pp. 178-184, 17 figs. Details of Chanard-Etoile skylight ventilator system, its construction and application.

Heating and. See HEATING AND VENTILATION.

Industrial, Effective Temperature Applied to. Effective Temperature Applied to Industrial Ventilation Problems, C. P. Yagloglou and W. E. Miller. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 7, July 1924, pp. 515-539, 8 figs. Concise report of investigation of effective temperature with moving air as conducted by Society's Research Laboratory in coöperation with Bur. of Mines. Industrial applications of experimental facts for improving working conditions.

Mines. See also FANS, Mine.

Office Buildings. Summer Ventilation and Cooling of Office Building, P. H. Bryce. Heat. & Vent. Mag., vol. 21, no. 8, Aug. 1924, pp. 56-57. How small refrigerating machine was used to reduce indoor temperature from 80 deg. to 70 deg. fahr. and to maintain relative humidity of 70 per cent.

Ozone, Uses in. See OZONE, Ventilation, Use in.

Schools. See HEATING AND VENTILATION, School Buildings.

Ships. See SHIPS, Ventilation.

Standards of. Modern Trend in the Science of Ventilation, Perry West. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 6, June 1924, pp. 421-438, 2 figs. 20 years of evolution in ventilation; theoretical and practical standards of ventilation.

Still-Air Conditions, Temperatures for. Effective Temperatures for Still Air Conditions and Their Application to Mining, F. C. Houghten, C. P. Yaglaglou and R. R. Sayers. U. S. Bur. Mines—Reports of Investigations, no. 2563, Jan. 1924, 10 pp., 8 figs. on supp. plates. Results of experiments made under carefully controlled conditions to determine relative feeling of warmth experienced by men in atmospheres of various degrees of temperature and humidity.

Theaters. See HEATING AND VENTILATION, Theaters.

Theory. Scientific Bases of Ventilation (Die wissenschaftlichen Grundlagen der Lüftungslehre), H. Selter. Gesundheits-Ingenieur, vol. 47, no. 38, Sept. 16, 1924, pp. 428-430. Development of scientific ventilation; results of experiments at two schools showing effect of air conditions on mental capacity, etc.; endorses Flügge's view that ventilating question must be viewed from standpoint of heat accumulation.

Tunnels. See TUNNELS, Ventilation.

Windows. See WINDOWS.

VENTURI METERS

Pulsating Flow. Venturi Meter for Pulsating Flow. Engineering, vol. 137, no. 3027, Jan. 4, 1924, pp. 7-9, 14 figs. Describes new type of instrument known as 1922 Venturi Recorder, which appears to have overcome serious objection to venturi meter when working with pulsating flow.

VIADUCTS

Concrete-Arch. Big Four Cutoff Involves Monumental Bridge. Ry. Age, vol. 77, no. 3, July 19, 1924, pp. 99-103, 8 figs. Cleveland, Cincinnati, Chicago & St. Louis constructing 13.7 miles of grade revision and double track work on its Indianapolis-Cleveland line which embraces a seven-mile relocation involving some very heavy and spectacular construction of which most important feature is a reinforced-concrete arch viaduct at Sidney, Ohio. Details of construction of bridge.

Construction Methods and Plant for Conneaut Viaduct. Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1046-1049, 5 figs. Seven-span, open-spandrel, arch-rib, 12,000-cu. yd. concrete road bridge at Conneaut, Ohio; length 1317 ft., width, overall, 46 ft. Portable concreting units each consisting of a 7-cu. ft. mixer, and mast hoists used.

Reinforced-Concrete Viaduct of Plougastel on the Elorn Estuary near Brest (Le viaduc en beton armé de Plougastel sur l'estuaire de l'Elorn, près de Brest). Génie Civil, vol. 84, no. 2169, Mar. 8, 1924, pp. 221-222, 4 figs. Project designed by M. Freyssinet has three large arches entirely of reinforced concrete, resting on two piers, with double-level roadway, street-car rails being on lower level.

Conversion of Truss Spans into. Through-Truss Spans Converted to Deck Girder Viaduct. Eng. News-Rec., vol. 92, no. 4, Jan. 24, 1924, pp. 150-152, 3 figs. Without halting traffic Chicago elevated railroad places columns and girders to carry floor of two truss spans over Union Station; four large derricks handle new steel and old trusses.

Double-Decked Street Improvement, Chicago. The Double Decked, South Water Street Improvement in Chicago. Mun. & County Eng., vol. 66, no. 1, Jan. 1924, pp. 4-6. Describes plan for great marginal double-decked distributing viaduct and street along north and west sides of central business district.

Jamaica Bay Boulevard. Building the Concrete Viaduct on Jamaica Bay Boulevard, F. W. Skinner. Contractors' & Engrs.' Monthly, vol. 8, no. 6, June 1924, pp. 47-52, 4 figs. See also Good Roads, vol. 67, no. 2, Aug. 1924, pp. 49-53 and 55, 5 figs. $3,000,000 causeway for heavy automobile traffic has roadway from 36 to 72 ft. wide; discusses causeway, viaduct and bulkhead, concrete cast piles, floor platform, beach channel abutment, causeway construction, pile driving, handling and transporting piles and concreting superstructure.

Piers. See BRIDGE PIERS, Bracing.

Plate-Girder. Construction Features of the Spring Street Viaduct, Atlanta, J. H. Reed. Contractors' & Engrs.' Monthly, vol. 8, no. 5, May 1924, pp. 47-49, 3 figs. Plate-girder structure coated with gunite has eliminated grade crossings and expedited vehicular traffic.

VIBRATIONS

Bridges. See BRIDGES, RAILWAY, Vibrations.

Buildings. Study of Vibrations Produced in Buildings by Passing Vehicles (Etude des vibrations produites dans les édifices par la circulation des véhicules), P. Prache. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 136, no. 6, June 1924, pp. 548-559, 5 figs. Details of

instruments for measuring vibrations and their application in measuring vibrations by street cars on macadam roads, asphalted roads, etc.

Framed Structures. Elastic Vibrations of Framed Structures, K. Mise. Kyushu Imperial Univ. College of Eng.—Memoirs, vol. 3, no. 1, 1923, 50 pp., 15 figs. partly on supp. plates. Investigates general vibration of a framed structure and derives general formula expressing natural frequency of vibration; extending theory of loaded structure, effect of additional load on frequency of vibration of framed structure is considered.

Machinery. The Vibration Problem in Engineering, C. R. Soderberg. Elec. Jl., vol. 21, nos. 1, 2, 3, 4, 6, 7, and 12, Jan., Feb., Mar., Apr., June, July, and Dec. 1924, pp. 39-43, 53-55, 89-97, 160-165, 295-299, 330-334, and 579-582, 46 figs. Fundamental facts underlying problem of vibration, its general effects and methods usually employed in preventing and curing vibration troubles; review of theory; mechanical balancing. Theoretical considerations and practical arrangement of vibration absorbers. Discussion of most important phases of analytical work which should be applied to every design of high-speed rotating machinery with a view of eliminating vibrations. Influence of stationary parts of electric machines upon critical speeds of rotating members.

Vibration and Noise, R. B. Grey. Electrician, vol. 92, no. 2392, Mar. 21, 1924, pp. 354-355, 4 figs. Their isolation as affecting erection of machinery; methods by which it has been successfully accomplished during last few years.

Vibration and Structural Damage, E. Latham. Engineering, vol. 117, no. 3032, Feb. 8, 1924, pp. 163-164, 4 figs. Describes physical results which may arise as result of vibration transmitted by operation of machinery in industrial plant.

Recorders. See MEASURING INSTRUMENTS, Vibration Recorders.

Recording. A New Process for Recording Small Vibrations (Ueber ein neues Verfahren zur Registrierung kleiner Schwingungen), G. Schmaltz. Maschinenbau, vol. 3, no. 18, June 26, 1924, pp. 639-641, 7 figs. Describes highly sensitive apparatus for recording small vibrations and gives examples of application; can be fixed to any part of machine.

A Vibration Recorder and Some of Its Applications, C. G. Beall and C. I. Hall. Gen. Elec. Rev., vol. 27, no. 5, May 1924, pp. 297-303, 19 figs. Describes device for detecting and recording characteristics of vibrations and tremors. One of the principal uses for this apparatus is found in study of muscle tremors, a knowledge of which is becoming of increasing interest to medical profession.

VIBROGRAMS

See OIL ENGINES, Torsiograms of.

VISCOSIMETERS

Capillary-Tube. Capillary Tube Viscometers, G. Barr. Jl. of Sci. Instruments, vol. 1, nos. 3 and 4, Dec. 1923 and Jan. 1924, pp. 81-86 and 111-116, 2 figs. Principles underlying construction and use of viscometers in which viscosity of a liquid relative to that of some standard is estimated from resistance offered by a tube to flow of liquid through it.

Fischer-Bauer. Measuring Viscosity in Ceramics (Viskositätsmessungen in der Keramik), E. P. Bauer. Berichte der Deutschen Keramischen Gesellschaft, vol. 5, no. 2, Aug. 1924, pp. 27-35, 2 figs. Discusses various methods, and describes Fischer-Bauer apparatus, constructed on drop-ball principle with a counterweight added to decelerate time of drop. Examples of application.

Gallo. A New Type of Viscosimeter (Un nuovo tipo di viscosimetro), G. Gallo and M. Tenani. Giornale di Chimica Industriale ed Applicata, vol. 6, no. 6, June 1924, pp. 280-283, 2 figs. Describes viscosimeter consisting of two parallel metal disks, very close together, rotating on same axis at different speeds, immersed in oil to be tested; develops formulas for calculation.

Gases, for. A Simple Viscometer for Gases, A. O. Rankine. Jl. of Sci. Instruments, vol. 1, no. 4, Jan. 1924, pp. 105-111, 4 figs. Describes instrument of a type which has been used for measuring viscosities of a large number of gases at two different temperatures. Details of mode of preparing apparatus and of its practical use, more particularly in relation to comparison of viscosities.

Klever. Relation Between Time of Flow of Klever Rapid Viscosimeter and the Engler Viscosimeter (Ueber die Beziehung zwischen den Ausflusszeiten des Kleverschen Schnellviscosimeters und des Englerschen Viscosimeters), H. W. Klever, R. Bilfinger and K. Mauch. Zeit. für angewandte Chemie, vol. 37, no. 36, Sept. 4, 1924, pp. 693-695. Experiments show that there is only a rough regularity in Klever apparatus and this cannot be reduced to a law.

Lidstone. Notes on the Lidstone Viscosimeter, Guy Barr. Chem. & Industry, vol. 43, no. 7, Feb. 15, 1924, pp. 29T-30T. Discusses design of mercurial viscosimeter and interpretation of results obtained with it.

Mercurial. A Mercurial Viscosimeter Compensated for Density, F. M. Lidstone. Chem. & Industry, vol. 43, no. 14, Apr. 4, 1924, pp. 87T-88T, 1 fig. Describes apparatus which is modified form of viscosimeter described in previous issues of same journal.

VISCOSITY

Kinetic Theory. Some Notes on the Kinetic Theory of Viscosity, Conduction, and Diffusion, S. Chapman and W. Hainsworth. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. Sci., vol. 48, no. 284, Sept. 1924, pp. 593-607. Theory of viscosity and thermal conduction in gases possessed of rotatory as well as translatory energy; definition of temperature in non-steady state of a polyatomic gas; formula for coefficient of diffusion appropriate to a polyatomic gas; etc.

Liquids. Determining Viscosity of Highly Viscous Substances (Bestimmung der Zähflüssigkeit hochviscoser Körper), E. Berl, M. Isler and A. Lange. Zeit. für angewandte Chemie, vol. 37, no. 10, Mar. 6, 1924, pp. 128-132. Describes viscosity balance which gives relative values for viscosity and enables determination of viscosity at various temperatures.

See also LIQUIDS, Viscosities.

Magnetic. Magnetic Viscosity (Viscosité magnétique), Cr. Lapp. Journal de Physique et le Radium, vol. 4, no. 10, Oct. 1923, pp. 349-369, 10 figs. See also Industrie Electrique, vol. 33, no. 767, June 10, 1924, pp. 212-215, 4 figs. Discusses time as a factor in magnetization and in aging of magnets. Describes experiments and establishes curves for viscosity.

VISIBILITY

Measurement. Measuring Vertical Visibility (Ueber die Messung der vertikalen Sicht), A. Wigand and K. Genthe. Physikalische Zeit., vol. 25, no. 11, June 1, 1924, pp. 263-270, 5 figs. Discusses measuring of vertical visibility by means of pilot balloon and theodolite, distribution of cloudiness in connection with wind, temperature, moisture and clouds.

Measuring Visibility (Zur Präzisierung der Sichtmessung), A. Wigand and K. Genthe. Physikalische Zeit., vol. 25, no. 9, May 1, 1924,

pp. 212-223. Discusses method of measuring visibility of objects and its application to foggy and steamy atmospheres.

VISION

Speed of. See LIGHT, Time of Visual Impression.

VOCATIONAL TRAINING

Coöperative Vocational Guidance. Coöperative Vocational Guidance, G. L. Swiggett. U. S. Bur. Education—Commercial Education Leaflet, no. 8, Nov. 1924, 12 pp. Consideration of following problems: How can public high school and private vocational school best coöperate in effort to impress parents and children with importance of high-school education before undertaking vocational training; how can private vocational school assist high-school instructor in his vocational guidance work.

France. Vocational Education in the Metallurgical, Engineering, and Electrical Industries in France. Int. Labour Rev., vol. 10, no. 4, Oct. 1924, pp. 685-690. Collective and individual organization.

Germany. Training of Future Labor (Die Ausbildung des Arbeiternachwuchses), P. Setzermann. Technik u. Wirtschaft, vol. 17, no. 7, July 1924, pp. 149-155. Report of session of German Government Committee on Economics of Industry and Labor giving various opinions as to training of coming generation of workmen in various industries.

Guidance Office, Germany. Workers' Education and Vocational Guidance. Monthly Labor Rev., vol. 19, no. 6, Dec. 1924, pp. 171-172. Work of vocational guidance office in Harburg, Germany.

Vocational Guidance and Selection. The Use of Vocational Tests in the Selection of a Vocation, C. S. Myers. Roy. Soc. Arts—Jl., vol. 72, no. 3722, Mar. 21, 1924, pp. 291-298 and (discussion) 298-302. Vocational selection is defined as the process of choosing, by systematic examination of worker's mental and physical condition, those workers best fitted for vacancies in any one occupation. Work being done on the subject; methods of vocational testing.

VOLCANOES

Steam from, Utilization of. See STEAM, Volcanic, Utilization of.

VOLTAGE REGULATION

Effect of. The Live Question of Voltage Regulation, F. F. Ambuhl. Elec. News, vol. 33, no. 13, July 1, 1924, pp. 48-52, 5 figs. Discusses effect of voltage variation, regulation of feeders, selection of regulation, effect of regulators on feeder voltage, and regulation of branch feeders.

Regulators. Generator Automatic Voltage Regulators—Care and Adjustment, J. H. Ashbaugh. Power, vol. 59, no. 8, Feb. 19, 1924, pp. 290-292, 3 figs. Conditions that must prevail for proper voltage regulation; adjustment of field rheostats and regulator for rate of building voltage up or down; putting regulator into service.

The Application of the Saturated-Core Reactor and Regulator, D. K. Blake. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 7, July 1924, pp. 604-607, 4 figs. States briefly use of voltage regulators and reactors in transmission and distribution systems and mentions operating requirements which might be best met by use of saturated-core type regulators or reactors.

VOLTAGES

High. See HIGH VOLTAGES.

Induced, Hazards of. Hazards of Induced Voltages in Excitation Systems, Ralph Brown. Power, vol. 59, no. 5, Jan. 29, 1924, pp. 164-165, 3 figs. Describes use of field-discharge resistance to limit voltage that may be induced in field winding.

Overvoltages, Protection against. See ELECTRIC TRANSMISSION LINES, Protection.

Peak, Measurement of. A Scheme for Measuring Voltage Peaks, R. D. Mershon. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 2, Feb. 1924, pp. 156-158, 2 figs Scheme devised by author that requires only standard apparatus that is easily portable and that can be carried to any degree of accuracy desired, without especially skillful handling.

Peak Voltage Measurement by Means of a Neon Glow Lamp, L. E. Ryall. World Power, vol. 1, no. 5, May 1924, pp. 288-291, 6 figs. General theory; experiments and tests; striking voltage at various frequencies and with various wave forms; peak voltmeter for 3000-30,000 volts.

Surges in, Measurement. See ELECTRIC MEASURING INSTRUMENTS, Voltage Surges.

VOLTMETERS

Alternating-Current. A Novel Alternating-Current Voltmeter, L. T. Wilson. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 5, May 1924, pp. 446-448, 5 figs. Improved thermovoltmeter, which may be used at all frequencies up to and including 1,000,000 cycles; retains usual high sensitivity of thermovoltmeters so that it requires very small current—for full-scale deflection about 2 milliamperes.

Electrostatic. Electrostatic Voltmeter (Elektrostatische Spannungsmesser mit vollkommen abgeschirmtem Luftkondensator), A. Imhof. Schweiz. Elektrotechnischer Verein—Bul., vol. 15, no. 2, Feb. 1924, pp. 62-64, 4 figs. For direct measurements of very high voltages author recommends ordinary static voltmeter of quadrant type connected to specially arranged air condenser; coaxial to vertical metallic rod, which carries high potential, is placed at proper distance a small metallic collar; a second cylindrically formed metal piece surrounds both rod and collar; these two concentric cylinders are fully insulated from each other and from ground; it is claimed that instrument fulfills all theoretical requirements to highest degree.

Electrostatic Voltmeter (Ein statisches Messgerät für sehr hohe Wechselspannungen), K. A. Sterzel. Elektrotechnische Zeit., vol. 45, no. 7, Feb. 14, 1924, pp. 117-119, 7 figs. Simple and directly indicating voltmeter devised by author for direct measurement of a. c. voltages between 40 and 250 kv., which is to high degree independent of frequency, of its particular location in room, and of position of connecting lines; voltmeter is designed for about 2000-volt end deflection.

Kilovolt. Electrostatic Kilovolt Meter for High and Maximum Tensions (Chilovoltmetro elettrostatico di cresta per alte ed altissime tensioni), E. P. Vanoni. Elettrotecnica, vol. 11, no. 31, Nov. 5, 1924, pp. 766-768, 6 figs. Describes apparatus based on an oscillograph, maximum tension being measured by a light organ which under electrostatic repulsion and attraction indicates momentary variations of tension.

Uses in Railway Signal Maintenance. Some Uses of the Volt-Ammeter in D. C. Signal Maintenance, F. B. Weigel. Ry. Signaling, vol. 17, no. 1, Jan. 1924, pp. 14-16. Uses of a combination volt ammeter which has scales as follows: Voltage 0 to 1.5, 0 to 15, and 0 to 150, and ammeter scales 0 to 0.150, 0 to 1.5 and 0 to 15. For testing track circuits, switch circuit controller contacts, relay contacts, motor operating circuits, line relays, indicators, and hold clear coils, detecting and locating grounds on signal circuits, etc.

W

WAGES

Bonus Systems. See BONUS SYSTEMS.

Cost of Living and. Wages and the Cost of Living, Rob. J. Andersen. Indus. Mgmt. (N. Y.), vol. 68, no. 5, Nov. 1924, pp. 260-265. Author states that any industry that either willingly or unwillingly allows its wage scale to be based upon cost of living is proceeding upon an economically unsound principle.

Family-Wage System. "Family-Wage" System in Germany and Certain Other European Countries, Mary T. Waggaman. Monthly Labor Rev., vol. 18, no. 1, Jan. 1924, pp. 20-29. Methods of payment; labor's attitude on family wages.

Great Britain. Changes in Representative Wages in British Industry, H. B. Allin-Smith. Trade Information Circular (Supp. to Commerce Reports), no. 247, June 30, 1924, 25 pp. Details of present levels of full-time wage earnings currently recognized in particular trades.

Group Wage-Payment Plan. The Group Wage-Payment Plan, H. G. Perkins. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 464-466. Fundamental requirements for success of system; outstanding results; reduction of labor cost and after effect; influence of employment situation; executives are kept better informed.

Incentive Systems. Installing Wage Incentive Systems that Work, E. Beck. Factory, vol. 32, no. 6, June 1924, pp. 826-829, 940, 941, 942, and 943, 4 figs. Describes system installed 10 years ago in an Indianapolis pharmaceutical plant which, it is claimed, has raised hourly wage of employees, reduced unit cost in factory, and materially bettered working conditions in laboratories.

See also BONUS SYSTEMS.

Legislation, Australia and New Zealand. The Development of State Wage Regulation in Australia and New Zealand, D. M. Sells. Int. Labour Rev., vol. 10, nos. 4, 5, and 6, Oct., Nov., and Dec., pp. 607-629, 779-799, and 962-1004. Traces growth of concept which inspired origination and alteration of legislation. Oct.: Different types of wage-regulating machinery in various Australian states and New Zealand; summary of Commonwealth and State laws on subject. Nov.: Evolution of this legislation and account of principles underlying wage regulation. Dec.: Economic effects and present status of wage regulation.

"Manit" System. "Manit" System for Measuring and Stimulating Labor Effort, H. Haynes. Mech. Eng., vol. 46, no. 12, Dec. 1924, pp. 896-897, 2 figs. Describes system of wage payment and production incentive based on unit of labor effort known as "Manit" (man-minute) in which worker receives bonus for his production in excess of 60 manits per hr.; system also includes incentives for minimizing spoiled work and bonus for supervisors.

Minimum-Wage Laws. Minimum Wage Legislation in Canada and its Economic Effects, J. W. MacMillan. Int. Labour Rev., vol. 9, no. 4, Apr. 1924, pp. 507-537. Applies almost exclusively to women and girls and is administered by independent boards or commissions; its main effect on wages has been to reduce inequalities previously existing within single industry, while it has not tended to reduce higher wages; it has had marked effect in reducing hours of work and making them more uniform, and no deleterious effect on employment has been noted; relations between employers and workers have been improved.

Premium Systems. A Comparison of Premium Wage Plans, Rob. F. Miller. Mgmt. & Administration, vol. 7, no. 6, June 1924, pp. 699-704, 2 figs. Job costs, amounts of wages and relative advantages under different systems.

Setting Premium Rates, P. J. Rees. Machy. (N. Y.), vol. 31, no. 4, Dec. 1924, pp. 286-288, 5 figs. How premium rates can be determined in plants not engaged in quantity production.

Systems of Payment, A. Rothert. Eng. Production, vol. 7, no. 147, Dec. 1924, pp. 354-356, 6 figs. Emphasizes importance of time saving or increasing rate of production per unit of time, and of overhead charges; examination of Halsey and Rowan premium plans; system with 100 per cent premium introduced by author in 1918 at large work of Russian Gen. Elec. Co.

Rate Setting in Coal Mining. Day Wage Versus Tonnage Rates for Operating Labor Saving Machinery in Coal Mining, Jer. C. White. Coal Mine Mgmt., vol. 3, no. 11, Nov. 1924, pp. 23-27. Points out that day rate is faulty; application of piece-work rates; premium system eliminates unfairness of other systems.

U. S. Industries, 1914-1924. Wages, Hours and Employment in American Manufacturing Industries, July 1914-January 1924. Nat. Indus. Conference Board—Research Report no. 69, 1924, 104 pp., 33 figs. Data showing trends in wages from June 1920 through Jan. 1924, with relation to base figures for prewar month of July 1914. Composite trends in hours and employment for all industries covered are traced and figures showing total employment and average week per wage earner for plants furnishing data in each industry are given in tables for individual industries; report covers 23 major industries.

WALLS

Heat Transmission Through. See HEAT TRANSMISSION, Walls.

WAREHOUSES

Cement-Storage. See CEMENT, Storage Warehouses.

Cincinnati, Ohio. Cold-Storage and Terminal Warehouse at Cincinnati. Eng. News-Rec., vol. 93, no. 4, July 24, 1924, pp. 138-142, 6 figs. Design and layout of seven-story reinforced-concrete structure of Cincinnati Terminal Warehouse Co. Used for general storage, has accommodation for handling of perishable freight and extensive cold-storage facilities for perishable freight, furs and other goods. Flat-slab type; twin columns and girders for isolating cold-storage section; cement floor finish; cork insulation; dry pipe sprinklers; tracks on first floor.

Concrete. See CONCRETE CONSTRUCTION, REINFORCED, Warehouse.

Iron and Steel. Builds Warehouse at Los Angeles, D. Partridge. Iron Trade Rev., vol. 75, no. 16, Oct. 16, 1924, pp. 1011-1015, 10 figs. Details of largest and most modern steel warehouse on Pacific Coast, built by U. S. Steel Products Co.

Washington, D. C. A Modern Ice Making, Cold, Dry and Ice Storage Building, S. T. Smith. Am. Architect & Architectural Rev., vol. 125, no. 2443, Apr. 9, 1924, pp. 341-346, 16 figs. Design of cold and dry storage warehouse of Terminal Refrig. & Warehousing Co., Washington, D. C.

WARSHIPS

British Empire Exhibition. The Navy at the British Empire Exhibition. Engineering, vol. 117, nos. 3047 and 3051, vol. 118, nos. 3058, 3064, and 3065, May 23, June 20, Aug. 8, Sept. 19 and

26, 1924, pp. 675-676, 801-804, 185-189, 420-422, and 458-460, 32 figs. Detailed description of exhibits covering artillery, warships, submarines, airships, submarine mines, etc., and their equipment, including engines, boilers, superheaters, etc.

Cruisers. New Italian Warships. Engineer, vol. 128, no. 3596, Nov. 28, 1924, pp. 605-606, 1 fig. Details of new cruisers Trento and Trieste; length, 640 ft. 9 in.; speed, 35 knots; armament, eight 8-in. guns, twelve 4-in. guns, and 8 torpedo tubes in pairs.

Propelling Machinery of the New Light Cruisers, A. M. Charlton. Mar. Eng. & Shipg. Age, vol. 29, no. 3, Mar. 1924, pp. 177-181, 5 figs. Machinery arrangement details of 10 light cruisers constructed at Todd, Bethlehem and Cramp yards.

U. S. S. Omaha, J. G. B. Gromer. Am. Soc. Naval Engrs.—Jl., vol. 36, no. 2, May 1924, pp. 143-180, 10 figs. partly on supp. plates. See also Mar. Engr. & Motorship Bldr., vol. 47, no. 562, July 1924, pp. 254-258, 4 figs. Describes machinery installation. Each of four propelling units consist of high-pressure and low-pressure turbine, placed side by side and connected to line shafting and propeller by Westinghouse-McAlpine reduction gear placed directly astern of turbines.

Design. Strategical and Tactical Considerations Governing Warship Design, D. Sturdee. Shipbldg. & Shipg. Rec., vol. 23, no. 15, Apr. 10, 1924, pp. 417-419, 2 figs. See also Engineering, vol. 117, no. 3041, Apr. 11, 1924, pp. 475-476. Deals with oil engines; 10,000-ton cruisers; aircraft carriers; destroyers and small craft; strategical considerations. (Abstract.) Paper read before Instn. Nav. Architects.

Diesel-Engined. See DIESEL ENGINES, Warship.

Dismantling. Putting Metals of Fighting Ships to Peacetime Purposes, R. G. Skerrett. Compressed Air Mag., vol. 29, no. 4, Apr. 1924, pp. 823-827, 12 figs. Describes demolishing and dismantling of battlecraft for recovery of scrap metal.

Engineering Performances. Engineering Performances and the Rules for Engineering Competition, U. S. Navy, C. H. J. Keppler. Am. Soc. Naval Engrs.—Jl., vol. 36, no. 2, May 1924, pp. 181-207. Explains why the rules exist, why they contain provisions they do, features of efficient engineering operation each provision intends to bring out, and why they are modified from time to time in order to keep pace with new ideas and latest installations.

Floating Repair Shop. The "Dobbin"—A Repair Shop Afloat. Mech. Eng., vol. 46, no. 4, Apr. 1924, pp. 173-178, 7 figs. Purpose of which is to provide facilities ample for carrying out any work required on instruments or machinery aboard destroyers of U. S. Navy.

U. S. S. Medusa, D. F. Ducey. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 3, Aug. 1924, pp 377-433, 6 figs. Description of vessel designed and built for fleet repair work.

Foundries on. See FOUNDRIES, Ship.

Salvaging Hulls of. See SCRAP, Warship Hulls, Salvaging.

Scout Cruisers. U. S. S. Milwaukee, J. T. Alexander. Am. Soc. Nav. Engrs.—Jl., vol. 36, no 3, Aug. 1924, pp. 513-521, 2 figs. Description and official trials of one of ten scout cruisers authorized by Act of Congress, Aug. 29, 1916.

U. S. S. Raleigh, H. R. Keller. Am. Soc. Nav. Engrs.—Jl., vol. 36, no. 3, Aug. 1924, pp. 466-493, 5 figs. Description and trials of cruiser.

Scrapping. See SHIP WRECKING.

Submarines. See SUBMARINES.

Torpedo Boats. The French Torpedo-Boat "Enseigne Gabolde." Engineering, vol. 117, nos. 3042 and 3044, Apr. 18 and May 2, 1924, pp. 483-486 and 571-572, 26 figs. partly supp. plates. Details of seagoing boat built by Augustin Normand Co. for French Navy; propelling machinery consists of two independent sets of geared Parsons' turbines, each set being in separate engine room; satisfactory results of trails.

U. S. S. Colorado. The U. S. Battleship Colorado. Engineer, vol. 137, no. 3552, Jan. 25, 1924, pp. 90-92, 6 figs. partly on p. 96. Construction details and characteristics of battleship launched in March, 1921, at Camden, N. J., yard of N. Y. Shipbldg. Co.

WASTE ELIMINATION

Methods. Organizing to Prevent Materials Waste, C. B. Auel. Mgmt. & Administration, vol. 7, nos. 6, 7, and 8, June, July, and Aug. 1924, pp. 669-674, 65-70, and 185-190, 13 figs. Prevention and salvage of waste at Westinghouse plant. Standardization of parts; preparation of standards; purchasing specifications; manufacturing allowances and specifications; stores stocks control; quarterly "clean-up"; storing, boxing, and shipping; use of obsolete copper wire; etc.

WASTE HEAT

Boilers. See BOILERS, Waste-Heat.

Drying With. Waste Heat Driers for Whiteware, T. C. Walker, Jr. Am. Ceramic Soc.—Jl., vol. 7, no. 8, Aug. 1924, pp. 630-633, 1 fig. Fan produces change of air 4 to 6 times per min., drying 10 tons of filter-pressed clay in 24 hr.

Industrial Furnaces, Recovery from. Production and Recovery of Waste Heat from Industrial Furnaces (Entstehung und Gewinnung der Abhitze von Industrieöfen), P. Beck. Gesundheits-Ingenieur, vol. 47, no. 12, Mar. 22, 1924, pp. 90-95. Based on practical experiences important aspects of waste-heat installations are discussed; results of tests on high- and low-pressure waste-heat boilers; suggestions for further developments in design of such boilers.

Recovery. On the Recovery of Waste Heat from Open-Hearth Furnaces by the Use of Waste Heat Boilers, T. B. Mackenzie. West of Scotland Iron & Steel Inst.—Jl., vol. 31, parts 6 & 7, Mar.-Apr. 1923-1924, pp. 90-109. Discusses heat losses in open-hearth furnaces, application of waste-heat boilers, experience in operating, savings from waste-heat boilers; discussion; bibliography.

Waste Heat Recovery Pays Fuel-Oil Bill. Oil Engine Power, vol. 2, no. 11, Nov. 1924, pp. 579-583, 4 figs. At plant of Am. Chocolate Almond Co., which is powered with 65-hp. oil engine, jacket water from engine passes through exhaust heater on its way to feed pump of heating boiler; heat thus reclaimed is equivalent to 20 tons of coal per month.

Utilization. Economic Considerations in the Design of Waste-Heat Plants (Wirtschaftlichkeitsbetrachtungen bei der Bemessung von Abhitzeverwertungsanlagen), A. Konejung. Wärme, vol. 47, no. 30, July 25, 1924, pp. 345-348, 8 figs. Develops formulas and makes calculations for determining most suitable end temperature of heat-exchanging liquids and their velocity.

New Aims of Heat Utilization (Neuere Aufgaben der Wärmetechnik), M. Berner. Brennstoff- und Wärmewirtschaft, vol. 6, nos. 2 and 3, Feb. and Mar., 1924, pp. 21-28 and 41-48, 16 figs. Advantages of high-pressure steam for power generation and of steam accumulators, Ruths system, for equalization of boiler load with varying steam consumption are discussed. Lignite firing, mechanical stoking, pulverization.

The Greenock Corporation Waste Heat Installation, W. Hall. Elec. Rev., vol. 95, no. 2439, Aug. 22, 1924, pp. 282-284, 5 figs. Design and con-

struction of steam plant at Glebe Sugar Refinery, Greenock; boiler house contains four Stirling water-tube boilers, each of capacity of 35,000 lb. per hr. at pressure of 220 lb. per sq. in.; two 750-kw. machines coupled together are driven by one engine; hp. switchboard controls 750-kw. hp. generator and comprises weak-field relay, synchroscope.

The Reciprocal Utilisation of Waste Energy, B. M. Gerbel. Engineering, vol. 118, no. 3054, July 11, 1924, pp. 75-76. Discusses coöperation of different plants for purpose of utmost joint utilization of their fuel, besides combination between works of different power and steam requirements. Abstract of paper read before World Power Conference.

The Utilization of Exhaust Steam (A propos de l'utilisation de la vapeur d'échappement), F. D'Espine. Chaleur & Industrie, vol. 5, no. 46, Feb. 1924, pp. 53-61, 8 figs. Calls attention to fuel economy which can be effected by rational utilization of waste heat, and gives numerical values showing profits which can be realized by installations for this purpose; examples of waste-heat installations.

Using Condenser Cooling Water of Municipal Refuse Incinerator at Barmen for Operation of Two Public Baths (Ausnutzung des Kondensatorkühlwassers der Städtischen Müllverbrennungsanstalt in Barmen für den Betrieb zweier Badeanstalten), K. Rheineck. Wärme, vol. 47, no. 32, Aug. 8, 1924, pp. 371-373, 1 fig. Utilization of waste heat results in saving nearly all coal formerly used for baths.

Using Heat in Waste Gases for Economizers (Die Ausnutzung der Abgaswärme durch Economiser), C. Rühl. Wärme- u. Kälte-Technik, vol. 26, no. 22, Nov. 15, 1924, pp. 203-205, 5 figs. Discusses advantages of economizers, their construction and application.

Using Waste Heat From Annealing Furnaces in Cold-Rolling Mills (Die Verwertung der Abwärme von Topfglühöfen in einem Kaltwalzwerk), H. Frank. Wärme, vol. 47, no. 41, Oct. 10, 1924, pp. 479-483, 14 figs. Describes plant which enables whole works to be heated from annealing furnaces, and gives cost data.

See also CEMENT MILLS, Mexico; CERAMIC PLANTS, Waste-Heat Utilization; COKE OVENS, Waste-Heat and Gas Utilization; HEATING, HOT-AIR, Waste-Heat Utilization; OPEN-HEARTH FURNACES, Waste-Heat Recovery; PAPER MILLS, Waste-Heat Utilization.

WASTE STEAM

Utilization. Bases of Economic Use of Waste Steam and Mixed Steam (Die Grundlagen wirtschaftlicher Verwertung von Abdampf und Zwischendampf), M. Pauer. Wärme, vol. 47, nos. 27 and 28, July 4 and 11, 1924, pp. 313-315 and 328-332, 8 figs. Discusses thermodynamic bases for plants with power and heating requirements, plants with steam power only and throttled life steam for heating and others. July 11: Savings due to heating with waste steam, reconstruction of plants.

Present State of Waste-Steam Technology and Economics in Germany (Gegenwärtiger Stand der Abdampftechnik und Abdampfwirtschaft in Deutschland), H. Treitel. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 35, Aug. 30, 1924, pp. 896-901, 11 figs. Discusses types of machinery and processes for turning to account all heads of heat and avoiding losses by condensation, including back-pressure machines, mixed steam, exhaust steam, etc.

Waste Steam Utilization Plants for Shafts I, II, III, IV and V of the Rombach Iron Works [Die Abdampfverwertungsanlagen auf den Schachtanlagen I, II, III, IV and V der Rombacher Hüttenwerke, Abt. Oberhausen (Rhld)], Fr. W. Netke. Gesundheits-Ingenieur, vol. 47, no. 38, Sept. 16, 1924, pp. 434-439, 12 figs. Use of waste steam for hot water and heating purposes; storage boilers; conveying to distance in cork-insulated overhead pipe lines; etc.

WASTE UTILIZATION

Foundry Wastes. See CUPOLAS, Waste Utilization.

Methods. Making the Most of Waste Materials, R. S. Emmet. Factory, vol. 33, no. 3, Sept. 1924, pp. 340-342 and 386, 7 figs. Scrap handling and disposal methods of salvage and scrap department of Schenectady, N. Y., works of Gen. Elec. Co.

Utilization and Prevention of Waste, C. B. Auel. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 407-411. Duties of salvaging engineer should be studying of plant for purpose of (1) preventing or minimizing waste items, (2) reclaiming as much of unavoidable waste as possible; (3) disposing of waste to best advantage, and (4) applying wastes of other manufacturers to one's own products; describes how problem is handled by Westinghouse Co. See (abstract) in Am. Mach., vol. 61, no. 18, Oct. 30, 1924, pp. 681-684.

WATER

Analysis. Standard Methods of Water Analysis, J. J. Hinman, Jr. Can. Engr., vol. 47, no. 2, July 7, 1924, pp. 131-133. Report of Committee no. 1 presented at annual convention of Am. Water Works Assn., giving results of experiments by various members of committee.

The Bacteriological Examination of Water, C. T. Butterfield, Eng. & Contracting (Water Wks.), vol. 62, no. 6, Dec. 10, 1924, pp. 1283-1285. Discusses what constitutes good laboratory technique.

Boiler Feedwater. See BOILER FEEDWATER.

Dielectric Properties of. The Dielectric Properties of Water for Continuous Waves, G. D. Southworth. Physical Rev., vol. 23, no. 5, May 1924, pp. 631-640, 5 figs. Direct measurement of refractive index of water for continuous waves of length about 2 meters. Describes an oscillating circuit for producing short continuous Hertzian waves of length varying from 1 meter up, in which tube capacity is used as a means of coupling.

Filtration. See WATER FILTRATION.

Flow of. See FLOW OF WATER.

Hardness. Water Analysis (Beiträge zur Wasseranalyse), J. Zink and F. Hollandt. Zeit. für angewandte Chemie, vol. 37, no. 35, Aug. 28, 1924, pp. 672-675. Discusses determination of hardness by Blacher method, changes in water on standing, determination of magnesium chloride.

Heat Transmission to Pipes. See HEAT TRANSMISSION, Water Flowing Inside Pipes.

Heaters. See WATER HEATERS.

Measurement of. Bulk Measurement of Water. Power Engr., vol. 19, no. 221, Aug. 1924, pp. 302-303, 6 figs. Gives notes on modern weir records and electric level records.

See also FLOW OF WATER; WATER METERS.

Purification. See WATER TREATMENT, Purification.

Softening. See WATER TREATMENT, Softening.

Thermodynamic Surface. The Characteristic Surface (Thermodynamic Model) for Water (Die thermodynamische Fläche des Wassers), A. Brandt. Annalen der Physik, vol. 73, no. 5-6, Feb. 1924, pp. 409-411, 3 figs. Points out that thermodynamic surface for water has much more

complicated appearance than that of normal substances; it is shown perspectively in figure; diagram shows that water at atmospheric pressure has its greatest density at 4 deg. cent., but at higher pressures greatest density corresponds to lower temperature than this; at pressures above 2200 atmos., ordinary ice assumes allotropic form which is denser than water at same pressure and temperature.

Viscosity in Passage through Sand. Tests on the Viscosity of Water in Very Narrow Passage Sections (Versuche über die Viskosität des Wassers in sehr engen Durchgangsquerschnitten), K. v. Terzaghi. Zeit. für angewandte Mathematik u. Mechanik, vol. 4, no. 2, Apr. 1924, pp. 107-113, 2 figs. Equations are given for expressing relation between pore volume and coefficient of permeability of granular material; for sand, equation agrees well with observed results, whereas with clays, differences are evident, which leads to conclusions on increase of viscosity of water in very narrow capillary tubes.

WATER ELEVATORS

Boulton. A Deep Well Water Elevator. Engineer, vol. 138, no. 3592, Oct. 31, 1924, p. 506, 2 figs. New Boulton water elevator, with which water is raised from depth of over 400 ft., recently put down at Citadel Barracks, Dover.

WATER FILTRATION

Filters. See FILTERS; FILTERS, SAND.

Flocculation. Study of Flocculation Phenomenon with Microscope, J. R. Baylis. Eng. News-Rec., vol. 92, no. 18, May 1, 1924, pp. 768-769, 4 figs. Excess coagulation, toughness of floc, and results of rapid mixing explained largely on physical basis.

Moving Sand Filters. The Problem of Filtering Water and Its Modern Solution by Means of Moving Sand Filters (Il problema della filtrazione dell'acqua e la sua moderna soluzione con il filtro a sabbia mobile), C. Pétot. Ingegneria, vol. 3, no. 8, Aug. 1, 1924, pp. 279-283, 9 figs. Discusses filtering methods by freezing, boiling, chemical treatment, microbicide action, ultraviolet rays, and sand; describes moving sand pressure filter as installed at Turin.

Plants. Mechanical Filtration Plant at Putnam, Connecticut, F. O. Stevens. New England Water Works Assn.—Jl., vol. 38, no. 2, June 1924, pp. 103-110, 4 figs. partly on supp. plates. Details of modernized plant capable of furnishing 3,000,000 gal. at cost of $41,000, making use of old structure in new design and substituting mechanical for slow sand plant.

Mechanical Filtration Plant, Lauzon, Que., H. G. Hunter. Can. Engr., vol. 46, no. 9, Feb. 26, 1924, pp. 279-280, 3 figs. Description of plant having capacity of 1,000,000 gal. per day; comprises low- and high-lift De Laval pumps, coagulating and clear water basins, and mechanical gravity filters; supply from St. Lawrence River.

New Filtration Plant for Border Cities, W. Storrie. Can. Engr., vol. 46, no. 12, Mar. 11, 1924, pp. 315-316, 1 fig. Layout of water purification plant now under construction at Ford, Ont., which will serve seven municipalities and will have a capacity of 20,000,000 gal. per day, and notes on reinforced-concrete reservoir.

Sacramento's Filtration Plant. Pub. Wks., vol. 55, no. 2, Feb. 1924, pp. 51-54, 3 figs. See also Eng. World, vol. 24, no. 2, Feb. 1924, pp. 69-73, 5 figs., and Southern Engr., vol. 41, no. 1, Mar. 1924, pp. 35-38, 6 figs. Capacity of 48,000,000 gal. a day; manufactures its own alum and chlorine; pumping plant all operated by electricity and is in duplicate, including two companies furnishing current.

The New $3,000,000 Filtration Plant of Sacramento, Cal., A. Givan. Eng. & Contracting (Water Works), vol. 61, no. 1, Jan. 9, 1924, pp. 89-91. Describes water supply portion of filtration plant which comprises an intake pier located in Sacramento River ¼ mile below confluence of Sacramento and American rivers, and two siphon intake conduits from intake pier leading easterly to pumping station about 1000 ft. distant.

What Accurate Control of an Old Filter Has Accomplished, E. G. McConnell. Fire & Water Eng., vol. 75, no. 13, Mar. 26, 1924, pp. 587-588 and 614-616, 6 figs. Methods adopted to obtain accurate control of dosage and flow of solutions to old filter plant in Charlotte, N. C., which was soon to be superseded by an entirely new unit. Excerpts from paper read before annual convention of North Carolina Sec., Am. Water Wks. Assn.

See also FILTRATION PLANTS.

Standard of Clarity. Sensitive Detection of Suspended Matter and a Proposed Standard of Clarity in Filtered Water, J. R. Baylis. Am. Water Works Assn.—Jl., vol. 11, no. 4, July 1924, pp. 824-832, 2 figs. Discusses determination of turbidity of filtered water, new turbidimeter, determining suspended matter in filtered water and proposed standards.

Swimming Pools. See SWIMMING POOLS, Water Filtration.

WATER GAS

Backrun Process. Backrun Method of Water Gas Set Operation, F. W. Steere. Gas Age-Rec., vol. 53, no. 25, June 21, 1924, pp. 861-865, 5 figs. Text of paper read before Wisc. Gas Assn. on advantage of installing backrun gas apparatus.

Backrun Process Tests and Results at Moline, Ill., H. A. Kleinman. Gas Age-Rec., vol. 53, no. 18, May 3, 1924, pp. 597-600 and 602, 1 fig. Operating results obtained with backrun process, both with 100 per cent coke as generator fuel and with coke and coal mixtures of about 50 per cent each, as compared with results obtained by standard operation when using similar generator fuels.

Bituminous Coal as Generator Fuel. Bituminous Coal in Large Water-Gas Generators, W. J. Murdock. Gas Age-Rec., vol. 53, no. 17, Apr. 26, 1924, pp. 555-561, 4 figs. Experience of Coal Products Mfg. Co., at Joliet, Ill., with 11-ft. generators.

Central District Bituminous Coals as Water-Gas Generator Fuel, W. E. Odell and W. A. Dunkley. U. S. Bur. Mines Bul. 203, 1924, 92 pp., 11 figs. Results of investigation made which consisted of study of practice already developed and difficulties encountered, development of operating methods that would obviate these difficulties, testing various coals of Central District to determine which might be considered for this purpose, and study of technical conditions involved in manufacture of water gas from bituminous coals.

Eastern Bituminous Gas Coal as Water Gas Fuel, Geo. H. Smith. Gas Age-Rec., vol. 54, no. 1, July 5, 1924, pp. 3-6 and 14, 3 figs. Gives results of test in operating plant.

Blue. Blue Water Gas Offers Industrial Fuel Economies, D. J. Demorest. Chem. & Met. Eng., vol. 31, no. 23, Dec. 8, 1924, pp. 887-890, 5 figs. Discusses economy and its applications particularly for small furnaces operating at high temperatures and processes like welding, where high temperatures must be obtained without regeneration.

CO Removal. See GAS MANUFACTURE, CO Removal.

Detarring by Electrical Precipitation. Detarring Gases by Electrical Precipitation, N. H. Gellert. Am. Gas Jl., vol. 121, no. 22, Nov. 1, 1924, pp. 1129-1130 and 1134. Principle of process and its application to water-gas purification.

Gas Coal as Generator Fuel. Superheating Steam and Blast in Water Gas Sets, W. H. Gartley. Gas Age-Rec., vol. 53, no. 16, Apr. 19, 1924, pp. 521-522 and 528, 1 fig. Discussion of gas coal as generator fuel with use of steam and air superheated in a separate vessel.

Lignite as Generator Fuel. The Use of Earthy Crude Lignite for Gas Making, K. Bunte. Am. Gas Jl., vol. 121, no. 21, Oct. 25, 1924, pp. 1107-1108 and 1120-1123, 2 figs. Describes a number of practical experiments which were conducted on a large scale in Frankfort gas works in Germany with this very low grade fuel. Translated from Gas u. Wasserfach.

Manufacture. Superheated Steam and Air Blast in Water Gas Manufacture. Am. Gas. Jl., vol. 121, no. 6, Aug. 9, 1924, pp. 736-738. Description of results obtained. Abstract of paper read before Annual Convention of Ill. Gas Assn.

Water Gas and Hydrogen (Wassergas und Wasserstoff). Zeit. für Sauerstoff- u. Stickstoff-Industrie, vol. 16, nos. 7 and 9, July and Sept. 1924, pp. 49-53 and 65-70, 6 figs. Discusses production of water gas, its composition, properties and uses, and describes Dellwik-Fleischer water gas plant. Describes Bamag-Meguin hydrogen plant. Storage and conveying of hydrogen under pressure.

Plant Operation. Rochester's Water Gas Plant Has a Checkerless Carburetter, W. N. Whitney. Gas Age-Rec., vol. 54, no. 3, July 19, 1924, pp. 75-79, 13 figs. Details of construction and equipment features of new water gas plant of Rochester Gas & Elec. Corpn.

Plant Tests. A Critical Study of the Published Results of Tests of Water Gas Plant, M. W. Travers. Gas Jl., vol. 168, nos. 3210 and 3211, Nov. 19 and 26, 1924, pp. 510-513 and 580-582, 1 fig. See also Gas World, vol. 81, no. 2103, Nov. 8, 1924, pp. 472-474 and Chem. & Industry, vol. 43, no. 51, Dec. 19, 1924, pp. 355T-361T, 1 fig. Relationship between three sub-processes into which water-gas process may be analyzed, usually referred to as blow, run, and clinkering processes; balance sheets of tests; test methods.

WATER HAMMER

Calculation. Calculating Water Hammer (Die Berechnung des Wasserschlages), Bundschu. Bauingenieur, vol. 5, no. 21, Nov. 10, 1924, pp. 697-702, 7 figs. A summary of Allievi's theory and treatment of the question, for pipe lines completely shut off, for those partly shut off, and calculation of pressure drop on opening lines.

Moderating Effects of. Water Hammer (Il colpo d'ariete), G. B. Ugolini. Annali dei Lavori Pubblici, vol. 62, nos. 1 and 2, Jan. and Feb. 1924, pp. 7-57 and 101-130, 51 figs. partly on supp. plates. Extended study describing methods for lessening its harmful effects in pipe lines and means for utilizing it in form of sonic waves for power transmission.

WATER HEATERS

Gas. Automatic Gas Water Heater Discussed from All Angles, O. L. Maddux. Gas Age-Rec., vol. 53, no. 9, Mar. 1, 1924, pp. 245-250, 3 figs. Types of automatic heaters, construction details, amount of gas it should burn monthly, and automatic storage systems.

Instantaneous. Instantaneous Electric Water Heaters (Elektrische Durchlauferhitzer), F. Berger. Siemens-Zeit., vol. 4, no. 2, Feb. 1924, pp. 38-40, 7 figs. Describes and recommends small instantaneous water heaters requiring only 1 kw. of energy; three main types have been developed, namely, immersion unit heater, transformer type, and electrode type.

WATER-LEVEL INDICATORS

Types. Water Level Indicators (Über Wasserstandsfernmelder), H. Goetsch. Zeit. für Fernmeldetechnik Werk- u. Gerätebau, vol. 5, no. 3, Mar. 17, 1924, pp. 17-19, 14 figs. Discusses indicators both full and empty for water levels of water towers, reservoirs, etc.; continuous level recorders; automatic pump connection and disconnection; addition of telephone to indicator lines.

WATER MAINS

Cleaning. Cleaning Apparatus for Water Mains at the British Empire Exhibition. Engineering, vol. 117, no. 3044, May 2, 1924, p. 587, 7 figs. Describes types exhibited at Brit. Empire Exhibition.

Water Main Cleaning at New Albany, Indiana, J. O. Endris. Mun. & County Eng., vol. 66, no. 6, June 1924, pp. 271-274. Method of cleaning 12-in. and 16-in mains; results from cleaning and incidental advantages.

Damages from Stray Current. An Example of Damages of Water Mains through Stray Currents and Their Measurement (Ein Beispiel über die Zerstörung von Wasserleitungsröhren durch vagabundierende Ströme und deren Messung), A. Rauche. Elektrischer Betrieb, vol. 22, no. 8, Apr. 24, 1924, pp. 61-62, 4 figs. Results of voltage measurements, current-density and voltage-loss measurements to investigate clause of damages and to determine means of prevention.

Extensions, Financing of. Financing Municipal Water Supply Extensions, C. M. Saville. Am. Water Wks. Assn.—Jl., vol. 11, no. 1, Jan. 1924, pp. 38-64 and (discussion) 64-71, 1 fig. Practical method of financing municipal water main extensions. Discusses several methods in use, commenting upon their advantages and drawbacks, giving particular attention to "guarantee" and "assessment" methods; citations from public utility commissions and some legal opinions. Principles of assessment method as employed at Hartford, Conn., and results of its workings.

Laying. How to Determine the True Cost of Main Laying, E. E. Bankson. Fire & Water Eng., vol. 75, no. 20, May 14, 1924, pp. 991-992 and 1014, 3 figs. Analytical article comparing costs of distribution system work at various periods and elements which control them.

Laying Water Main Across Grand River (Ont.), J. Taylor. Can. Engr., vol. 46, no. 2, Jan. 8, 1924, pp. 121-123, 4 figs. Shore sections laid in open cofferdams and box cofferdams employed for center section; lead joints made in dry and crane used for laying pipe; piles not used owing to rock bottom.

See also PIPE LAYING, Water Mains.

Submarine Laying. Submarine Pipe Laying for the Narrows Siphon, New York. Eng. & Contracting (Water Works), vol. 62, no. 4, Oct. 8, 1924, pp. 779-782, 1 fig. Method of placing about 8800 ft. of 42-in. flexible joint cast-iron main across Narrows of New York harbor at a depth of about 56 ft. below mean sea level.

Types. Large Supply Mains, D. H. Maury. Am. Water Wks Assn.—Jl., vol. 12, no. 1, Sept. 1924, pp. 1-41 and (discussion) 41-60, 19 figs. See also Eng. News-Rec., vol. 92, no. 25, June 19, 1924, pp. 1052-1054, 1 fig. Principal types of pipe available for large supply mains, including cast iron, steel, concrete and wood-stave pipe, and process of manufacture; approximate estimates of first costs for various diameters and pressures.

WATER METERS

Attachment for Fixed Liquid Quantities. Meter Attachment for Delivering Fixed Quantities of Liquids. Engineering, vol. 117, no. 3049, June

6, 1924, p. 749, 2 figs. Fitting exhibited at British Empire Exhibition enables water meter automatically to supply given quantity of liquids and then to cut off flow.

Open-End Flume. Open-End Flume Water Meter Based on Exponential Equation, J. W. Ledoux. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 505-506, 4 figs. Universally applicable within practical limits. Equipped with indicating, recording, and totalizing meter.

Rates and Consumption, Effect on. How Meters Affect Rates and Consumption, E. I. Roberts. Fire & Water Eng., vol. 75, no. 2, Jan. 9, 1924, pp. 61-62 and 69-70, 5 figs. Study of rates and meter installation of cities and towns of Ohio; comparison between metered and unmetered municipalities.

Types. Water Measuring Devices, R. L. Daugherty. Am. Water Works Assn.—Jl., vol. 11, no. 4, July 1924, pp. 808-818. Discusses direct and indirect types; weirs, current motors, pitot tubes, venturi meters, their accuracy, etc.

Volumetric. Volumetric Water Meters (Ueber Volumen-Wassermesser), Bamberger. Gas- u. Wasserfach, vol. 67, no. 45, Nov. 8, 1924, pp. 674-678. Discusses German and American waterworks practice; use of volumetric meters for determining exactly quantity at works and supplied to consumers.

WATER PIPES

Action of Water on. The Action of Water on Service Pipes, W. Donaldson. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 649-662. Problem of delivery of water from street mains to faucets of consumers without impairment of quality of water or without deterioration of service pipe itself. Extent of use of various kinds of service pipe; life of service pipe. References.

Cast-Iron. Iron Deposit in Cast-Iron Pipes, J. R. Fox. Surveyor & Mun. & County Engr., vol. 66, nos. 1716, 1717, and 1718, Dec. 5, 12, and 19, 1924, pp. 465-466 and (discussion) 491-492 and 509-510. Deals with incrustation in pipes carrying certain of the soft waters from Pennine range, England. Discusses how pipes are affected, rate of incrustation, scraping process, prevention of incrustation, use of concrete-lined pipes. From paper read before Instn. Water Engrs.

Cleaning. An Effective Method of Cleaning Clogged Service Pipes, T. L. Amiss. Fire & Water Eng., vol. 75, no. 20, May 14, 1924, pp. 993-994, 2 figs. Description of process using oxygen gas, and explanation of equipment required.

The Cleaning of Cast Iron Water Pipe Lines, C. Haydock. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 533-541. Discusses losses due to corrosion and tuberculation, and results obtained by cleaning such lines.

Two Railroads Find Water Pipe Cleaning Profitable. Ry. Eng. & Maintenance, vol. 20, no. 2, Feb. 1924, pp. 64-66, 8 figs. Describes work done by Northern Pacific and Chicago, Rock Island & Pacific railways in removing from water-supply lines incrusted material which had accumulated to such a depth as seriously to impair or destroy their serviceability.

Corrosion. Film Protection as a Factor in Corrosion, F. N. Speller. Am. Electrochem. Soc.—Advance paper no. 22, for meeting Oct. 2-4, 1924, pp. 313-325, 3 figs. Factors influencing corrosion; natural protective coatings; factors influencing character and deposition of protective films; artificial protective coatings formed in water; limitation of scale protection on water pipe.

Reinforced-Concrete. Reinforced Concrete Pipe for Water Supply Lines Under Pressure, F. F. Longley. New Eng. Water Wks. Assn.—Jl., vol. 38, no. 3, Sept. 1924, pp. 257-286, 12 figs. See also Eng. & Contracting (Water Wks.), vol. 62, no. 5, Nov. 12, 1924, pp. 1071-1076, 9 figs. Methods of constructing lock joint pipe for pressure water supply. Discusses hydraulic qualities, water-tightness, durability, cost, and justification for its use.

Thawing of Frozen. Thawing Frozen Water Pipes with Electric Current, D. D. Ewing and C. F. Bowman. Eng. & Contracting (Water Wks.), vol. 62, no. 6, Dec. 10, 1924, pp. 1271-1276, 5 figs. Summary of present practices. From bulletin of Eng. Extension Service of Purdue Univ.

Types. Types of Pipe for Water Main Construction, S. B. Morris. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 564-571. Discusses the various types of pipe being manufactured for water works distribution purposes.

WATER POLLUTION

Oil. Pollution by Oil of the Coast Waters of the United States, F. W. Lane, C. P. Bowie and J. S. Desmond. World Ports, vol. 13, no. 2, Dec. 1924, pp. 33-53. Pollution by oil of Atlantic and Gulf coasts; pollution form oil-burning ships and from cargo vessels; methods and devices of disposing of oil wastes from vessels; handling by barge methods; oil-water separators on ship; fire hazard. Pollution by oil of Pacific coast; operation of tank ships; pollution by oil fields, city sewage, etc.

The Control of Oil Pollution in Rhode Island, S. DeM. Gage. Boston Soc. Civil Engrs.—Jl., vol. 11, no. 6, June 1924, pp. 237-279, 7 figs. Discusses causes and effects of pollution by oil and describes methods of successful control in Rhode Island.

WATER POWER

Applications. Applications of Hydro-Electric Power, T. J. Mirchandani. World Power, vol. 2, no. 11, Nov. 1924, pp. 289-292, and vol. 3, no. 13, Jan. 1925, pp. 36-39. Nov. 1924. Comparison between hydroelectric and steam-electric powers; application of hydroelectric power to railway electrification. Jan. 1925: Electrochemical industries.

Canada. Utilization of Water Power in Canada. Can. Engr., vol. 46, no. 24, June 10, 1924, pp. 601-604, 1 fig. Review of water-power development in relation to coal production, importation, and consumption in Canada. Water-power development has relieved situation, particularly in acute fuel area by saving in coal consumption. See also Eng. Wld., vol. 24, no. 5, May 1924, pp. 287-289.

Water Power Development in Canada, J. B. Challies. Can. Engr., vol. 47, no. 8, Aug. 19, 1924, pp. 257-263, 3 figs. Also Engineering, vol. 118, no. 3061, Aug. 29, 1924, pp. 301-302. Outline of extent, utilization, and administration of water powers in Canada. Abstract of paper read before British Assn. for Advancement of Science.

Water Powers of Canada, J. B. Challies. Eng. Jl., vol. 7, no. 7, July 1924, pp. 323-358, 44 figs. partly on supp. plate. Their nature, extent and administration, a national review.

Cost of. The Cost of Hydro-Electric Power, C. V. Christie. Eng. Jl., vol. 7, no. 4, Apr. 1924, pp. 177-180 and (discussion) 180-183, 1 fig. Effect of power factor, load factor, and diversity factor on cost of power.

Flathead River. Power Possibilities of the South Fork, Flathead River, B. E. Jones and E. E. Jones. Eng. News-Rec., vol. 93, no. 3, July 17, 1924, pp. 96-98, 4 figs. Large reservoir site makes economic development of power possible. Increased height of Flathead Lake objectionable.

Hydraulic Turbines. See HYDRAULIC TURBINES.

Norway. The White Coal of Norway. Electrician, vol. 93, no. 2407, July 4, 1924, pp. 8-11, 6 figs. Surveys Norway's water power, relation of state to its utilization, and gives details of power stations.

Pulp and Paper Industry, Canada. Water Power in the Pulp and Paper Industry in Canada. Canada Dominion Water Power Branch, no. 731, Mar. 1, 1924, 17 pp. See also Power House, vol. 17, no. 20, Oct. 20, 1924, pp. 77 and 80-81, 1 fig. Gives complete list of pulp and paper mills operated by water power showing principal features in connection with motive power installation, and discusses power problems.

See also PAPER INDUSTRY, Water Power.

Steam and, Relative Costs of. Relative Cost of Water and Steam Power. Power, vol. 59, no. 21, May 20, 1924, pp. 827-828. Construction costs and fixed charges for water plant are as rule twice as great as for steam plant and overbalance smaller operating expense; steam plant has greater reserve capacity and is in position to render better and safer service.

Sweden. Sweden's Water Power. Electrician, vol. 93, no. 2408, July 11, 1924, pp. 39-42, 4 figs. Deals with general electricity supply in Sweden and steps which have been taken by State to control and employ large amount of power that is available; describes various hydroelectric stations owned and operated by state and gives general power situation.

Swedish Water-Power Resources and Their Utilization (Schwedens Wasserkräfte und deren Ausnutzung), F. V. Hansen. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 14, Apr. 5, 1924, pp. 321-327, 13 figs. Water-power resources are estimated at 10,000,000 hp. for six months of year; present status of utilization and estimated power requirements; technical details of more important hydroelectric plants.

World Resources. What the World Power Conference Showed About the World's Natural Power Resources. Elec. Wld., vol. 84, no. 11, Sept. 13, 1924, pp. 511-514, 2 figs. Data on water powers and coal reserves gleaned from reports of London gathering showing relative position of various nations. United States leads in potential wealth of natural resources.

World Power (Welt-Kraft), van Heys. Technik u. Wirtschaft, vol. 17, nos. 10 and 11, Oct. and Nov. 1924, pp. 229-240 and 257-261, 6 figs. A graphico-statistical summary of total water power, developed and undeveloped, total coal in sight, etc., compiled from combined World Power Conference papers.

WATER SUPPLY

Argo, Ill. Corn Products Water Supply and Underground Pumps. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 501-503, 6 figs. Recession of groundwater levels in Chicago district necessitated building of underground pumping station 357 ft. below surface connected by pipe lines in tunnels to a system of 10 wells 1200 to 1500 ft. deep, formerly pumped by air lift from surface to a storage reservoir, to provide for well supply required by Corn Products Refining Co., at Argo. Features of construction of shaft, pump chambers, tunnels and well connections.

Arid Regions. See Arizona; California.

Arizona. The Lower Gila Region, Arizona, C. P. Ross. U. S. Geol. Surv.—Water Supply Paper no. 498, 1923, 230 pp., 54 figs., partly on supp. plates. Geographic, geologic, and hydrologic reconnaissance with a guide to desert watering places.

California. The $39,000,000 Water Project of the East Bay Cities (Cal.). Eng. News-Rec., vol. 93, no. 24, Dec. 11, 1924, pp. 960-961, 1 fig. Mokelumne River project includes dam 340 ft. high, 81 mi. of pipe line, 9.5 mi. of tunnel.

The Salton Sea Region, California, J. S. Brown. U. S. Geol. Sur.—Water Supply Paper no. 497, 1923, 283 pp., 48 figs. partly on supp. plates. A geographic, geologic, and hydrologic reconnaissance with a guide to desert watering places.

The Use of Balancing Reservoirs in Water Distributing Systems, J. E. Phillips. Am. Water Works Assn.—Jl., vol. 11, no. 4, July 1924, pp. 793-796. Discusses advantage of balancing reservoirs or kickback tanks used to meet peak load requirements.

Conservation of Resources. State and National Duty in Conservation of Water Resources, O. E. Grunsky. Eng. News-Rec., vol. 92, no. 1, Jan. 3, 1924, pp. 11-12. New stream policy: government planning and control of water storage.

Corrosive Effect of. Determining Corrosive Effect of Water Supplies, J. W. Ledoux. Fire & Water Eng., vol. 76, no. 18, Oct. 29, 1924, pp. 969-970, 997 and 999-1000, 2 figs. Suggestions as to neutralization of corrosion arising from qualities in water supply, and methods of determining relative corrosibility of these supplies. Excerpts from paper read before Pa. Water Wks. Assn.

Distribution Systems. Design and Maintenance of Distribution Systems, W. E. MacDonald. Fire & Water Eng., vol. 75, no. 11, Mar. 12, 1924, pp. 491-492, 514 and 516-517, 1 fig. See also Concrete Rec. & Eng. Rev., vol. 38, nos. 14 and 15, Apr. 2 and 9, 1924, pp. 329-331 and 360-362, 1 fig. Fire protection must be considered in planning system; location of gate valves and fire hydrants; detection of water waste. Excerpts from paper read before Can. Sec. Am. Water Wks. Assn.

Fire-Protection. The Relation of Fire Protection Requirements to the Distribution System of Small Towns, C. Goldsmith. Am. Water Wks. Assn.—Jl., vol. 12, no. 2, Oct. 1924, pp. 168-178 and (discussion) 186-190, 4 figs. Discusses plans for distributing systems for towns of 1000 to 1500 to have available adequate water in case of fire.

Groundwater. Determining Quantity of Ground Water (Die Mengenbestimmung bei Grundwasser), H. Winterer. Gas- u. Wasserfach, vol. 67, nos. 38 and 39, Sept. 20 and 27, 1924, pp. 563-566 and 581-583, 1 fig. Discusses hydrologic investigations, application of Darcy and Smreker laws, and develops fundamental equations for calculation and gives practical examples of application.

Producing Artificial Ground Water at Frankfort, Germany, Scheelhaase and G. M. Fair. Eng. News-Rec., vol. 93, no. 5, July 31, 1924, pp. 174-176, 3 figs. Highly polluted river water after filtration percolates through sandy soil to increase ground water supply.

The Occurrence of Ground Water in the United States, With a Discussion of Principles, O. E. Meinzer. U. S. Geol. Surv.—Water Supply Paper no. 489, 1923, 314 pp., 166 figs., partly on supp. plates. Deals with occurrence; origin, discharge, and quantity; movement and head; quality; recovery and use; and groundwater provinces.

Hardness vs. Public Health. The Relation of Hardness in Water Supply to Public Health, E. S. Chase. Am. Water Works Assn.-Jl., vol. 11, no. 4, July 1924, pp. 873-880. Discusses effect of hardness of drinking water on health, using mortality statistics.

Idaho. Geology and Water Resources of the Goose Creek Basin, Cassia County, Idaho, A. M. Piper. Idaho Bur. Mines & Geol., Bul. no. 6,

1923, 74 pp., 6 figs. on supp. plates. Survey was made to determine feasibility of developing additional water supply from flowing wells.

Ilion, N. Y. City of 10,000 Builds $500,000 Water System, Chas. M. Niles. Am. City, vol. 30, no. 1, Jan. 1924, pp. 21-23, 4 figs. Large storage reservoir under construction at Ilion, N. Y.; dam will form lake holding 150,000,000 gal. of water, which insures 5 months' supply.

Leaks, House-to-House Inspection. The Control of Waste from Water Fixtures by House-to-House Inspection in New York City, E. Nuebling. Mun. Engrs.—Jl., vol. 10, no. 1, 1924, pp. 37-51 and (discussion) 51-58. Account of inspection work done and results accomplished thereby; describes method of conducting work and gives account of studies made as to amount and nature of fixture leakage and reduction in consumption that can be effected by house-to-house inspection.

Maryland State Institution. Water and Sewerage Construction at State Institutions by Maryland Department of Health, G. L. Hall. Eng. News-Rec., vol. 93, no. 13, Sept. 25, 1924, pp. 490-495, 4 figs. State Bureau of Sanitary Engineering designs and builds water supply and purification plants and sewerage systems and sewage-works. Institutions pay for service. Features of design, construction, and operation of works installed.

Metering. An Improved Water Supply for Chicago and the Relation of Metering to Service, J. Ericson. West. Soc. Engrs.—Jl., vol. 29, no. 10, Oct. 1924, pp. 371-378. Summary of efforts made to improve water supply of Chicago; urges adoption of universal metering as sensible means of overcoming these conditions. See also article entitled, Metering the Water Supply of the City of Chicago, H. A. Allen, pp. 379-400, 13 figs.; and discussion, pp. 400-404.

Pollution. See STREAM POLLUTION.

Railway. Construction of Gravel Wall Wells Solves Water Supply Problem, C. R. Knowles. Ry. Eng. & Maintenance, vol. 20, no. 4, Apr. 1924, pp. 143-144, 3 figs. Describes novel installation which greatly increased supply and reduced operating cost; facilities include two deep wells with motor-driven pumps of vertical-turbine type, brick pump houses, 100,000-gal. water tank and 12-in. water columns.

Rainfall. See RAINFALL.

Seattle, Wash. Looking Forward to a Future Water Supply, J. H. Quense, Jr. Fire & Water Eng., vol. 76, no. 5, July 30, 1924, pp. 205-206 and 213-215, 12 figs. Description of proposed extension of water supply of city of Seattle, Wash.

Surface, Canada. Surface Water Supply of Canada—St. Lawrence and Southern Hudson Bay Drainage, Ontario, S. S. Scovil. Canada, Dominion Water Power Branch—Water Resources Paper no. 42, 1924, 90 pp., 2 maps. Hydrometric data covering climatic year 1922-23.

Surface, United States. Surface Water Supply of the United States, 1919-1920, N. C. Grover. U. S. Geol. Survey—Water Supply Paper, no. 514, 1924, 204 pp., 5 figs. North Pacific slope drainage basins.

Surface Water Supply of the United States, 1919 and 1920. Pacific Slope Basins in California, N. C. Grover. U. S. Geol. Surv.—Water Supply Paper no. 511, 1923, 449 pp., 5 figs. on supp. plates. Records of measurements of flow made on streams.

Surface, Washington. Summary of Hydrometric Data in Washington, 1878-1919, G. L. Parker and L. Lee. U. S. Geol. Surv.—Water Supply Paper no. 492, 1923, 357 pp., 16 figs. on supp. plates. Gaging-station records of stage and monthly and yearly discharge measurements. Bibliography.

Tastes, Offensive. Offensive Tastes in Public Water Supplies, Chas. F. Dalton. Am. Jl. Pub. Health, vol. 14, no. 10, Oct. 1924, pp. 845-847. Report of Committee on Sanitary Engineering on causes and occurrences of offensive tastes.

Tulsa, Okla. Spavinaw Water Supply Project for Tulsa, Oklahoma. Eng. News-Rec., vol. 92, no. 19, May 8, 1924, pp. 816-818, 2 figs. 55-mi. gravity conduit brings Ozark supply to reservoir lower than city; pumps lift to high-service reservoir.

Tulsa's New Water-Supply Project, A. Chesser. Explosives Engr., vol. 2, no. 12, Dec. 1924, pp. 411-414, 8 figs. Notes on work in construction of tunnels and laying of pipe lines in connection with Spavinaw project for supplying this city with water from Ozark Mountains, 60 miles away.

Waste Detection. Locating Leaks in the Distribution System, C. C. Behney. Fire & Water Eng., vol. 76, no. 12, Sept. 17, 1924, pp. 637-638, 648, 657-661, 5 figs. Discusses how to determine cause of waste; use of pitot tube.

Underground Water Waste Detection Work in New York City, F. B. Nelson. Mun. Engrs.—Jl., vol. 10, no. 1, 1924, pp. 23-36. See also Eng. & Contracting (Water Works), vol. 61, no. 6, June 11, 1924, pp. 1289-1296. Notes on subsurface conditions; organization and methods employed; equipment; results; cost and value.

Wells. See WELLS.

WATER TOWERS

Domed. A Domed Water Tower, S. A. Bunting. Concrete & Constructional Eng., vol. 19, no. 8, Aug. 1924, pp. 496-499, 2 figs. Design and construction of 18,000-gal. water tank with base 35 ft. from ground level supplying salt colony and works at Sambhar, Rajputana with fresh water.

WATER TREATMENT

Aeration. See Purification.

Alum Feeding Device. Simple Alum Feeding Device for Water Treatment Saves in Cost and Space. Contract Rec. & Eng. Rev., vol. 38, no. 16, Apr. 16, 1924, pp. 376-377, 4 figs. Details apparatus designed as emergency; results have indicated its economy and reliability for every-day use.

Alum Floc Composition. Composition of Alum Floc in Mixing Basin, E. S. Hopkins. Am. Water Wks. Assn.—Jl., vol. 12, no. 4, Dec. 1924, pp. 405-409, 4 figs. Applicability to plant operation of principles of mixing basin floc presented in paper by L. B. Miller. Proves that floc precipitated from dilute solutions necessary in water purification processes and under stimulated plant conditions has same chemical composition as stated by Miller to be true for that precipitated from concentrated solutions.

Bathing Beaches. See WATER TREATMENT, Chlorination.

Biochemical Factors in. Biochemical Factors in Modern Methods of Water Purification, G. J. Fowler. Mysore Engrs.' Assn.—Bul., vol. 1, no. 1, July-Sept. 1923, pp. 1-10. See also Surveyor & Mun. & County Engr., vol. 64, no. 1667, Dec. 28, 1923, pp. 523-524. Typical impurities to be met with in the different sources of water supply, viz., lake or reservoir, stream or river, and spring or well, and methods of purification.

Boiler Feedwater. See BOILER FEEDWATER, Treatment.

Chlorination. Chlorinating Bathing Water, W. P. Baker and P. E. McNabb. Can. Engr., vol. 47, no. 20, Nov. 11, 1924, pp. 507-508, 2 figs.

A practical method for treating water at bathing beaches which has been employed with success at Washington, D. C. Results of chlorination.

Report on Experimental Use of Chlorine Gas in the Chlorination Plant at Köpenick, I. Reichle and M. Weldert. Gesundheits-Ingenieur, vol. 47, no. 24, June 14, 1924, pp. 237-243. Addition of small quantities of chlorine gas has given good results.

Taste and Odor in Chlorinated Water, R. M. Warren and E. Bartow. Am. Water Works Assn.-Jl., vol. 11, no. 4, July 1924, pp. 881-886. Discusses methods for removing chlorine taste and odor.

The Chlorination of Small Water Supplies, M. F. Tiernan. Am. Water Wks. Assn.—Jl., vol. 12, no. 3, Nov. 1924, pp. 272-278 and (discussion) 278-281. Discusses reasons why small supplies have more operating difficulty than large supplies, viz., personnel, location of apparatus, kind of operation—continuous as against intermittent, and geographical location.

The Paterson Chloronome for Sterilising Water. Engineering, vol. 117, no. 3031, Feb. 1, 1924, pp. 142-143, 3 figs. Apparatus embodies means for delivering high-pressure gas from steel cylinders in which it arrives, in measured quantities at constant and lower pressure to water to be treated, and ensuring its distribution through body of water; two types are described, the Pulser and the manometer type.

Coagulation. Alum Agitation Studies at Reading, Pennsylvania, C. R. Cox. Eng. News-Rec., vol. 93, no. 3, July 17, 1924, pp. 101-104, 4 figs. Importance of thorough mixing in coagulation of turbid waters with alum. Fifteen minutes at a little over 0.5 ft. per second meets Reading conditions.

Colored Water. See Purification.

Cooling Water. Treatment of Cooling Water. Times Trade & Eng. Supp., vol. 15, no. 330, Nov. 1, 1924, p. 154. Describes process for reducing steam consumption of turbines which is treatment of cooling water, continually and automatically, with trace or chlorine gas, so as to give what may be termed semi-sterilization and prevent growth of living organisms.

Degasification. The Degasification of Water, J. R. McDermet. Am. Water Wks. Assn.—Jl., vol. 11, no. 1, Jan. 1924, pp. 118-127. Describes methods

Dosage Control. Venturi Speed Controller for Dry Chemical Feed Devices, E. S. Smith, Jr., and C. G. Richardson. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, pp. 844-845, 2 figs. Installation at mechanical filter plant, Parsons, Kan., varies chemical dose according to rate of flow of raw water.

Hydrogen-Ion Concentration. Optimum Hydrogen Ion Concentrations for Coagulation of Various Waters, G. F. Catlett. Am. Water Works Assn.—Jl., vol. 11, no. 4, July 1924, pp. 887-895. Discusses method of determination of pH and optimum pH, use of pH in plant control; optimum pH for No. Carolina waters.

Iron Removal. De-ironing Plant of the German Maizena Company in Barby (Die Enteisenungsanlage der Fabrik der Deutschen Maizena-Gesellschaft in Barby), G. Thiem. Gas- u. Wasserfach, vol. 67, no. 36, Sept. 6, 1924, pp. 531-533, 3 figs. Describes plant on Thiem system, for treating groundwater having an iron content of 16.3-34.7 lmg and free CO_2 of 63-74 lmg, with a daily capacity of 10,000 cu. m.

Removal of Iron from Drinking Water (Untersuchungen über Enteisenung), Kisskalt. Gas- u. Wasserfach, vol. 67, no. 1, Jan. 5, 1924, pp. 3-4. Describes number of processes in which iron is removed from water by aeration effected by allowing water to flow down towers packed with coke, or by spraying it through nozzles; in this way iron is oxidized to hydroxide, which remains in colloidal solution until it is coagulated and removed by action of material forming filter bed.

Lime-Soda Process. See Purification.

Lime, Use of. Purification of Water Supplies, A. Houston. Eng. & Contracting (Water Works), vol. 62, no. 4, Oct. 8, 1924, pp. 821-823. English experiences in use of lime and chlorination.

Use of Lime in Water Purification, F. M. Veatch. Rock Products, vol. 27, no. 10, May 17, 1924, pp. 32-34, 1 fig. Extent of water purification; treatment for gases and odors, solids in suspension, bacterial contamination, and hardness; disadvantages of impure water.

Methods. Bad Water Made Suitable for Domestic and Power-Plant Use by Treatment and Purification, F. L. Serviss. Coal Age, vol. 26, no. 12, Sept. 18, 1924, pp. 398-402, 5 figs. Methods of analysis and treatment. Water usually requires less treatment for domestic use than for steam power-plant supply; accumulation of scale in boilers often greatest operating difficulty; any water can be made suitable.

Development of Mechanical Methods of Water Purification in Germany (Entwicklung der mechanischen Abwasserklärung in Deutschland), M. Kusch. Gesundheits-Ingenieur, vol. 47, no. 20, May 17, 1924, pp. 183-187, 8 figs. Modern types of basins, systems "Cöthen," "Neustadt" and "Kremer" for purification of sewage waters from cities.

Permutit Process. See Purification; Softening.

Plants. Intake and Purification of Surface Water (Entnahme und Reinigung von Oberflächenwasser für industrielle Anlagen), A. Vogt. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 24, June 14, 1924, pp. 632-634, 6 figs. Describes new plant for economic intake and purification of river water for factory purposes.

The Water Treatment Plant in Theory and Practice, P. Hansen. Fire & Water Eng., vol. 75, no. 17, Apr. 23, 1924, pp. 779-780 and 808. Necessity for coöperation between engineer who designs plant and its operator. Four points for engineer to remember.

Problems. Some Ontario Water Treatment Problems, A. V. Delaporte. Can. Engr., vol. 46, no. 11, Mar. 11, 1924, pp. 316-318. Few new recent developments in pre-treatment. Characteristics of water at Chatham, Richmond Hill, Forest and in Lake Ontario. Paper read before Canadian Sec. Am. Water Wks. Assn. See also account of discussion on chlorination, sedimentation, filtration and allied subjects, which followed presentation of this paper, Can. Engr., vol. 46, no. 20, May 13, 1924, pp. 509-513 and 528.

Purification. Present Methods of Water Purification in Providence, Rhode Island, J. W. Bugbee. New Eng. Water Wks. Assn.—Jl., vol. 38, no. 3, Sept. 1924, pp. 244-249. Present treatment consists of filtration at rate of 2.5 million gallons per acre per day, addition of hydrated lime in amounts varying between 50 and 100 lb. per million gallons, chlorination, using between 3 and 8 lb. per million gallons, and copper sulphate dosing for reservoirs whenever required.

The Function of Aeration in Water Purification, M. Pirnie. Mun. & County Eng., vol. 67, no. 1, July 1924, pp. 22-25. Discusses surface concentration, electrification, and gives brief review of conditions at some purification plants where aeration is important part of process.

The Purification of Colored Water at Wilmington, N. C., G. D. Norcom. Am. Water Wks. Assn.

—Jl., vol. 11, no. 1, Jan. 1924, pp. 96-117, 5 figs. Purification of water of Cape Fear River. Describes purification plant; description of raw water, including nature of color, its characteristics, and coagulation and decolorization; character of treated water.

Water Purification by Aeration. Public Works, vol. 55, no. 8, Aug. 1924, pp. 251-252. Discusses conditions resulting from aeration and probable causes; promotes chemical activity; electrification of drops by spraying; aids in coagulation and in iron removal.

Water Purification for Industrial Purposes, J. P. O'Callaghan. Engineering, vol. 117, no. 3035, Feb. 29, 1924, pp. 286-287. Sedimentation and filtration of water; softening by lime-soda process, and by permutit-zeolite process.

Purification Plants. Data on Which Design of a Purification Plant Should be Based, C. A. Brown. Fire & Water Eng., vol. 75, no. 8, Feb. 20, 1924, pp. 349-350 and 374-377. Intelligent design of a purification plant; helpful curves and data suggested.

Early Results from Memphis Water Purification Plant, W. Donaldson. Eng. News-Rec., vol. 93, no. 25, Dec. 18, 1924, pp. 992-994, 3 figs. Air-lift, aerators, mechanical filters and chlorinators remove iron, CO_2, hydrogen sulphide and bacteria from new well supply meeting initial demand of 15 million gal. daily.

Second Water Purification Works for Oklohoma City. Eng. News-Rec., vol. 93, no. 6, Aug. 7, 1924, pp. 216-219, 4 figs. Describes new combined clarification softening, double aeration and carbonization plant.

The Purification of Water Supplies, A. Houston. Surveyor & Mun. & County Engr., vol. 16, no. 1695, July 11, 1924, pp. 27-28. Discusses water filtration and sterilization methods, chlorination, super-chlorination and dechlorination. Abstract of paper read before British Waterworks Assn.

Railways. How the Chemical Engineer Tackles the Water Problems of a Railroad, W. M. Barr. Chem. & Met. Eng., vol. 31, no. 9, Sept. 1, 1924, pp. 348-351, 6 figs. Points out some of the many problems of water supply on a railroad and emphasizes necessity of solving them with aid of a chemical engineer rather than a laboratory chemist. Elimination of scale-forming solids and simultaneous production of non-foaming water all over a railroad system is a major technical problem.

Raw River Water. Water Treatment at Cahokia, E. H. Tenney. Power, vol. 59, no. 17, Apr. 22, 1924, pp. 647-648, 3 figs. Describes treating system, giving arrangement of chemical mixing and dilution tanks.

Settling Basins. Principles of Four Kinds of Flow in Settling Basins, W. Kiersted. Eng. News-Rec., vol. 93, no. 9, Aug. 28, 1924, pp. 346-347, 3 figs. Effect on sedimentation in straight-line, radial, rotary, and spiral inward-flow basins with evaluation of each.

Sodium Iodide. Sodium Iodide Treatment of Rochester's Water Supply, B. C. Little. Am. Water Wks. Assn.—Jl., vol. 12, no. 1, Sept. 1924, pp. 68-73 and (discussion) 73-86. Notes on experiment started in Apr. 1923 which so far shows no ill effects, and pros and cons on sodium iodide treatment of water in goitre districts.

Softening. Note on a Permutit Water Purification Plant (Note sur une installation d'épuration d'eau à la "Permutite" au siège de Victor 3-4, à Rauxel), M. Stoeffler. Chaleur & Industrie, vol. 5, no. 52, Aug. 1924, pp. 383-385, 1 fig. Details of permutite tests and comparative cost of apparatus and operations.

Water Softening by Base Exchange, G. C. Baker. Am. Water Wks. Assn.—Jl., vol. 11, no. 1, Jan. 1924, pp. 128-149. Nature of reaction of base exchange; history of development of process; advantages and disadvantages of zeolitic treatment over other methods of water softening; describes investigations undertaken to study problems dealing with zeolitic softeners; general properties of zeolitic softeners; tests on solubility of calcium carbonate in 10 per cent salt solution.

Water-Softening by Means of Doucil, T. P. Hilditch and H. J. Wheaton. Engineering, vol. 117, no. 3035, Feb. 29, 1924, pp. 287-288. Describes comparatively new base-exchange material manufactured under name of doucil.

Water-softening Plant at Erith. Engineer, vol. 138, no. 3593, Nov. 7, 1924, pp. 522-523, 6 figs. Describes Becco-Legg plant which has capacity of 160,000 lb. of water per hr.; softening is effected by addition of lime-soda mixture.

Sterilization. Economic Sterilizing Process of River Water for City Water Supply (Sur un procédé économique de stérilisation des eaux de rivières pour l'alimentation des villes), M. N. Adam. Revue Universelle des Mines, vol. 1, (series 7), no. 4, Feb. 15, 1924, pp. 249-255. Discusses sand filters, ozone, ferro-chlorine; tests in Middlekerke, Letoure, Paris.

Zeolitic. See Purification; Softening.

WATER WORKS

American vs. British Practice. A Comparison Between British and American Waterworks Practice, G. Mitchell. Surveyor & Mun. & County Engr., vol. 64, no. 1667, Dec. 28, 1923, pp. 525-529 (includes discussion). See also Fire & Water Eng., vol. 75, no. 7, Feb. 13, 1924, pp. 299-300, 318, 320, and 327-329. Main differences between the two countries in water works matters; discussion of practice in rainfall and stream gaging, sources of supply, reservoir dams, purification works, aqueducts, service reservoirs, distribution, etc.

Appliances. British Empire Exhibition; Waterworks Appliances. Engineering, vol. 117, nos. 3051 and 3052, June 20, and 27, 1924, pp. 783-786 and 814-816, 23 figs. Descriptions of exhibits, including water and other meters, valves, electrical controllers for valves, filter-sand washing machines, etc.

Brockville, Ont. Extension to Water Works, Brockville, Ont. Can. Engr., vol. 46, no. 12, Mar. 18, 1924, pp. 349-350, 3 figs. Two gasoline-engine-driven centrifugal pumps installed for standby service to reduce coal bill; total capacity, 2,500,000 gal. per day when pumping against a total head of 90 ft.

Condensers. See CONDENSERS, STEAM, Surface.

Cost System. A Cost System for Water Works in Large Towns and Small Cities, E. E. Peacock. Am. Water Works Assn.—Jl., vol. 11, no. 4, July 1924, pp. 797-807. Details of classification and subdivisions of unit cost system, covering collection, purification and distribution.

Diesel-Engined. See DIESEL ENGINES, Water Works.

Electrical Equipment. Modernizing Electrical Equipment in Water Plants, F. C. Bolton. Fire & Water Eng., vol. 75, no. 9, Feb. 27, 1924, pp. 399-400, 402-403 and 416-417, 1 fig. See also Eng. & Contracting (Water Works), vol. 62, no. 1, July 9, 1924, pp. 68-73. Connection between source of power and motors; emergency equipment; elements of cost; motors; etc.

Filtration Plants. See WATER FILTRATION, Plants.

Geophones, Use of. The Geophone in the Water Works Department, D. R. Taylor. Eng. & Contracting (Water Works), vol. 62, no. 1, July 9,

1924, pp. 59-60. How to use it and results obtained. Geophone is used to locate leaks in business section of city under paved streets and railway tracks where traffic is heavy; and to locate knock or hammer in machinery or engines especially internal-combustion type of engines in which there is piston slap or wrist pin knock.

Infiltration Galleries. Infiltration Galleries at the Des Moines, Iowa, Water, C. B. Burdick. New Eng. Water Wks. Assn.—Jl., vol. 38, no. 3, Sept. 1924, pp. 203-218, 8 figs. partly on supp. plates. Water is obtained through a system of collecting galleries, which constitute a horizontal well two miles in length, tapping a coarse sand stratum 15 to 20 ft. in thickness, and is derived almost entirely from infiltration from Raccoon River, which roughly parallels gallery system at a distance from 150 to 200 ft. Fundamental principles of this supply, conditions that make it possible, and quantity and quality of water obtained.

Memphis, Tenn. Why and How Memphis Water System is Being Replaced, F. G. Cunningham. Fire & Water Eng., vol. 75, no. 13, Mar. 26, 1924, pp. 591-592, 610 and 612-614, 7 figs. Description of new and up-to-date water supply and pumping facilities replacing entire old well system; considerations governing new project. Excerpts from paper read before annual mtg. of Indiana Sanitary & Water Supply Assn.

Oil Engines for. See OIL ENGINES, Water-Works.

Planning. Planning Municipal Water Works System. Can. Engr., vol. 46, no. 26, June 24, 1924, pp. 636-638. Points that have to be considered when town contemplates establishing water works system; services of competent engineer must be secured; pumping plant and distributing system must be large enough for increase in population.

Preliminary Investigations. The Value of Comprehensive Water Supply Investigations, A. Van Praag, Jr. Am. Water Wks. Assn.—Jl., vol. 11, no. 2, Mar. 1924, pp. 451-457 (including discussion). Discusses value of a comprehensive and systematic study of community's water resources prior to construction of water-works system, in so far as they apply to shallow groundwater sources.

Pumping Engines. See PUMPING ENGINES.

Pumping Plants. See PUMPING PLANTS, Water-Works.

Pumping Stations. See PUMPING STATIONS.

Quebec, Can. New Water Works System, Batiscan, Que., R. Morrissette. Can. Engr., vol. 46, no. 16, Apr. 15, 1924, pp. 425-427, 3 figs. Notes on original woodpipe line; difficulties in financing new plant; wells sunk, pumps installed and concrete reservoir constructed.

Rochester, N. Y. Sources of Supply, Conduits and Reservoirs, of the Rochester, N. Y., Water-works System, J. F. Skinner. New Eng. Water Wks. Assn.—Jl., vol. 38, no. 3, Sept. 1924, pp. 219-225, 4 figs.

St. Louis, Mo. St. Louis' Model Water Works to Supply 200,000,000 Gallons. Eng. Wld., vol. 25, no. 5, Nov. 1924, pp. 285-291, 15 figs. Account of work of St. Louis water department giving brief résumé of what has been accomplished by this city's engineers, together with a sketch of its early history and difficulties encountered.

Statistics. Water Works Statistics. Pub. Wks. vol. 55, no. 5, May 1924, pp. 161-174. Tabulated from questionnaires filled out by nearly 700 water-works officials. Mains laid in 1923; pressures in mains, both regular and for fire service; and pumping plants, with recent changes made in type of plant.

Unaccounted-For Water. Leakage and Unaccounted for Water, J. N. Chester and E. E. Bankson. Am. Water Wks. Assn.—Jl., vol. 11, no. 2, Mar. 1924, pp. 381-388 and (discussion) 388-392, 3 figs. Recalls conclusions from other discussions and relates experiences. Losses as percentage of pumpage; sources of unaccounted-for water; under registration or slippage of meters.

Wheeling, W. Va. Water-Works Improvements at Wheeling, West Virginia, J. F. Laboon. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, pp. 848-850, 4 figs. New intake, pumping station with low- and high-service electric-driven pumps, filter plant with chemical dust arrester and dry-feed machines, and group of steel storage tanks.

WATERPROOFING

Asphalt for. United States Government Master Specification for Asphalt for Waterproofing and Damp Proofing. U. S. Bur. Standards—Circular no. 160, Master Specification no. 85, Apr. 8, 1924, 9 pp., 3 figs. Specification officially adopted by Federal Specifications Board on Dec. 29, 1923, for use of Departments and Independent Establishments of the Government in purchase of asphalt for waterproofing and damp proofing.

See also ROOFS, Asphalt.

Asphalt Blocks for. Asphalt Blocks Make Satisfactory Protection for Waterproofing, M. Hirschthal. Eng. News-Rec., vol. 92, no. 10, Mar. 6, 1924, p. 397, 1 fig. Lackawanna R. R. uses asphalt blocks in preference to concrete or mastic; can be laid quickly; give better results.

Coal-Tar Pitch for. United States Government Master Specification for Coal-Tar Pitch for Waterproofing and Damp Proofing. U. S. Bur. Standards—Circular no. 155, Master Specification no. 83, Apr. 8, 1924, 11 pp., 3 figs. Specification officially adopted by Federal Specifications Board on Dec. 29, 1923, for use of Departments and Independent Establishments of the Government in purchase of coal-tar pitch for waterproofing and damp proofing.

Materials for. Exposure Tests on Colorless Waterproofing Materials, D. W. Kessler. U. S. Bur. Standards—Technologic Papers, no. 248, Jan. 7, 1924, 33 pp., 13 figs. partly on supp. plates. Description of tests on materials applied to surface of such porous materials as stone, brick, and concrete in order to render them impervious to moisture without materially changing natural appearance of surface, to compare effectiveness of the various waterproofing materials or methods in preventing absorption, and to determine their lasting qualities or period of effectiveness, relative effectiveness of materials on stones of various textures, and their effect on appearance of stone.

WATERSHEDS

Protection. Progress Report of Committee No. 5 on Watershed Protection. Am. Water Wks. Assn.—Jl., vol. 11, no. 3, May 1924, pp. 613-627. Five reports of observation and procedure which cover typical or unique problems in Pennsylvania, ranging from protection of practically uninhabited watersheds to the more extensive and complicated problems on watersheds where sewage and industrial wastes from densely populated districts are distinctly prejudicial to sources of public water supplies.

WATERWAYS

[See also CANALS; RIVERS.]

France. National Congress for Inland Navigation (Le congrès national de navigation intérieure), A. Pawlowski. Génie Civil, vol. 85, nos. 5 and 6, Aug. 2 and 9, 1924, pp. 116-118 and 133-137, 5 figs. Details of navigable rivers and canals, and their management, traffic and transportation, river Meuse, North-East Canal, fluvial ports, fluvial traction, etc.

Great Britain. Inland Waterways, S. E. M. Lewis. Inst. of Transport—Jl., vol. 5, no. 4, Feb. 1924, pp. 148-167. Discusses canal traffic, need for water transport, development of waterways.

Great Lakes. Great Lakes Engineering Problems, H. J. Lamb. Can. Engr., vol. 47, nos. 10 and 11, Sept. 2 and 9, 1924, pp. 289-292 and 315-318, 10 figs. Discusses charting of Lakes system; establishment of aids to navigation; harbor, canal and lock construction; improvement of connecting channels; character of structures employed; effect of works on traffic. Abstract of paper read before Eng. Sec., British Assn. for Advancement of Sci.

Illinois. The Illinois Waterway: Critical Link in Lakes to Gulf Waterway, L. D. Cornish. Ports & Waterways, vol. 1, no. 1, July 1924, pp. 6-9 and 44, 7 figs. Description of new waterway now under construction.

Railways and. Waterway and Railway Equivalents, W. M. Black. Am. Soc. Civil Engrs.—Proc., vol. 50, no. 6, Aug. 1924, pp. 837-851; and (discussion) vol. 51, no. 2, Feb. 1925, pp. 306-328. Discusses considerations that should guide establishment of new waterway lines of transportation, replacing destructive competition by coöperation.

St. Lawrence. St. Lawrence Deep Waterway to the Sea, F. C. Shenehon. Can. Engr., vol. 47, nos. 19 and 20, Nov. 4 and 11, 1924, pp. 481-487 and 501-506, 7 figs. Vital principles which should obtain in engineering ways of securing ultimate benefits from St. Lawrence waterway. From paper read before A. S. C. E. See also discussion of above paper by H. C. Sadler, pp. 477-478; by T. H. Hogg, pp. 479-480; by H. DeB. Parsons, Nov. 18, 1924, pp. 519-521, and by L. C. Sabin, Dec. 16, 1924, pp. 603-606.

WATT-HOUR METERS

Induction-Type. On the Creeping of Induction-Type Watt-Hour Meter, M. Oyama. Denki Gakkwai Zasshi (Jl. Inst. Elec. Engrs. Japan), no. 432, July 1924, pp. 679-682, 4 figs. Describes error caused by creeping to be taken into account when load is intermittent service of short period or light load. (In Japanese.)

Testing. Testing Single-Phase Induction Watt-Hour Meters, W. F. Walsh. Power, vol. 60, no. 18, Oct. 28, 1924, pp. 687-689, 5 figs. Problems worked out showing how to test meters, both when using indicating wattmeter and rotating standard.

WATTMETERS

Dynamometer. The Dynamometer Wattmeter, B. Hague. Electrician, vol. 92, no. 2384, Jan. 25, 1924, pp. 96-97, 2 figs. Notes on its theory; application of corrections.

Fawsett. New Precision Wattmeter. Electrician, vol. 92, no. 2390, Mar. 7, 1924, pp. 292 and 295, 3 figs. Details of Fawsett's design for high accuracy polyphase measurement.

High-Voltage. The High-Voltage Wattmeter, Phil. C. Clark and Chas. E. Miller. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 11, Nov. 1924, pp. 1009-1013, 6 figs. Structural details of wattmeter aggregation and loss-loading equipment and operating procedure for conducting atmospheric and insulator-loss measurements.

Low-Power Factor, High-Voltage. Power Measurements at High Voltages and Low Power Factors, Jos. S. Carroll, Thos. F. Peterson and Geo. R. Stray. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 10, Oct. 1924, pp. 941-949, 17 figs. Describes apparatus for measurement of power as low as fraction of watt at power factors approaching zero and voltages as high as 175 kv. to neutral.

Norma. Norma Wattmeter with New Device for Changing Current Range (Norma-Wattmeter mit neuen Umschaltevorrichtungen der Strommessbereiche), J. Schalkhammer. Elektrotechnik u. Maschinenbau, vol. 42, no. 27, July 6, 1924, pp. 428-430, 6 figs. Describes apparatus made by Norma Instruments Co. in Vienna.

Three-Phase. Three-Phase Balanced Load Wattmeters, G. W. Stubbings. Electrician, vol. 92, no. 2403, June 6, 1924, pp. 692-693, 3 figs. Inquires into probable amount of inaccuracy involved in use of single element wattmeter when unbalance of circuit is small, and compares performances of the various types of such instruments as are available.

Three-Phase Wattmeter Connections, Phil. C. Jones. Am. Inst. Elec. Engrs.—Jl., vol. 43, no. 4, Apr. 1924, pp. 356-360, 3 figs. Describes method from which may be determined three possible groups of connections existing in 6 zones from power factor of 0 per cent lagging to 0 per cent leading, and also actual power factor possible within each zone.

WAVE FILTERS

Electric. Electric Wave Filters, D. E. Richmond. Sibley Jl. of Eng., vol. 38, no. 3, Mar. 1924, pp. 61-63 and 76, 4 figs. Device which, when placed in an electrical system between a receiving instrument and a source of alternating e.m.f. of different frequencies, attenuates undesirable frequencies to a point where they do not effect instrument. Calculations.

Transmission Characteristics of Electric Wave-Filters, O. J. Zobel. Bell System Technical Jl., vol. 3, no. 4, Oct. 1924, pp. 567-620, 23 figs. Describes simple and rapid method of calculating steady-state transmission losses of wave-filter networks over both transmitting and attenuating frequency bands, including effects of dissipation and wave-filter terminal conditions, giving its theory, necessary charts, and an application of its use.

WAVE METERS. See RADIOTELEGRAPHY, Wave Meters.

WAVES

Ship-Produced. See SHIPS, Waves Produced by.

WEIGHING

Methods and Equipment. Process of Weighing in Factory Operations (Der Wägevorgang im Förderwesen der Betriebe), E. Volkhardt. Maschinenbau, vol. 3, no. 22, Aug. 28, 1924, pp. 810-813, 2 figs. Discusses characteristics of kinds of weighing, methods of working, time and cost, new ways of weighing.

WEIGHING MACHINES

Automatic. Weighing in Bulk, S. H. Johnson. Indus. Mgmt. (Lond.), vol. 10, no. 13, Dec. 27, 1923, and vol. 11, nos. 1 and 2, Jan. 10 and 24, 1924, pp. 366-370, 22-26, and 54-55, 9 figs. Historical review of automatic weighing machines; principles of automatic weighing machine, and description of different types; methods of compensation; dust protection; etc.

WEIGHTS AND MEASURES

Dynamic Theory, Evolution of. Evolution of the Dynamic Theory in the Laws of Weights and Measures (L'évolution de la notion dynamique dans les lois sur les poids et mesures), C. E. Guillaume. Revue Générale de l'Electricité, vol. 15, no. 18, May 3, 1924, pp. 779-780. Explains how distinction has gradually been defined between mass and weight and how this distinction has been introduced in legislative acts.

Inch and Millimeter, Relation between. The Relation Between Inches and Millimeters, C. C. Stutz. Am. Mach., vol. 60, no. 4, Jan. 24, 1924,

pp. 145-146. Discusses article by H. W. Bearce published in previous issue of same journal.

WEIRS

Flow Over. Trials with Triangular, Trapezium, Rectangular and Circular Weirs (Ueberfallversuche. Dreieckiger, trapezförmiger, rechteckiger und kreisrunder Ueberfall), A. Staus. Gas- u. Wasserfach, vol. 67, no. 26, June 28, 1924, pp. 371-375, 9 figs. For water meters with proportional recording instrument, triangular overfall is most unfavorable, circular overfall is to be preferred.

Movable. The Development of Movable Weirs (Die Entwicklung der beweglichen Wehre), Mangold. Bautechnik, vol. 2, nos. 7, 9, and 16, Feb. 8, 29, and Apr. 11, 1924, pp. 49-51, 68-72, and 164-167, 30 figs. Deals with different types of movable weirs, namely, sluice, pin, roller, drum, and segmental weirs.

Overflow. Recent Types of Overflow Weirs with Siphon [Su alcuni recenti tipi di sfioratori a sifone (Sifoni autolivellatori)], G. Ferro. Annali dei Lavori Pubblici, vol. 62, no. 4, Apr. 1924, pp. 293-308. Discusses construction of overflow weir with siphon of barrage dam at Wittersheim, Germany, on the principle of which many others are based, construction and application of automatic level siphons and their calculation.

Roller. Roller Weirs and Operation in Winter (Walzenwehre mit Winterbetrieb), O. Freystag. Bautechnik, vol. 2, no. 44, Oct. 10, 1924, pp. 507-508, 6 figs. Details of plant at Trollhätten (Sweden), Aarlifos (Norway), and Ensokoski (Finland), showing special heating arrangements to remove ice.

Semi-Circular. Semi-Circular Weirs Calibrated at Purdue University, F. W. Greve. Eng. News-Rec., vol. 93, no. 5, July 31, 1924, pp. 182-183, 2 figs. Extensive experiments dealing with curved weirs, or notches, cut in a vertical wall have been in progress for some time at hydraulic laboratory of Purdue Univ. Particulars of tests made as part of project, on semi-circular openings to determine relation between head and quantity of water discharged.

WELDERS

Arc, Training of. See ELECTRIC WELDING, ARC, Welders, Training of.

WELDING

Aluminum. See ALUMINUM, Welding.

Aluminum Castings. Hints for Welding an Aluminum Casting, E. E. Thum. Am. Welding Soc.—Jl., vol. 3, no. 5, May 1924, pp. 26-30, 3 figs. Details of actual practice.

Autogenous. See AUTOGENOUS WELDING.

Automatic Welding Machines. Automatic Welding of Tank. Welding Engr., vol. 9, no. 9, Sept. 1924, pp. 17-19, 5 figs. Describes new machine which automatically welds circular end seams; revolves around work; flame oscillates; increases production.

Car and Locomotive Parts. Autogenous and Electric Welding. Ry. Age (Daily Edition), vol. 76, no. 36, June 19, 1924, pp. 1718-1723 and (discussion) 1723-1728, 17 figs. Notes on rolled steel wheels; low-carbon-steel; wrought iron; cast iron; torch cutting; recommendations; regulations for welding. Report of committee presented before Am. Ry. Assn.

Cast Iron. The Welding of Cast Iron from a Metallurgical Point of View, J. G. Pearce. Acetylene Jl., vol. 26, nos. 3 and 4, Sept. and Oct. 1924, pp. 136-140, and 184, 186, 188, and 190, 10 figs. Discusses influence of carbon upon iron, influence of rate of cooling on structure, white and grey iron, elements in cast iron, influence of constitution on properties and on welding process, and welding special irons. Lecture delivered to Brit. Acetylene & Welding Assn., Lond. Taken from Acetylene & Welding Jl., Lond.

See also CAST IRON, Welding.

Cast-Iron Pipe. See PIPE, CAST-IRON, Bronze Welding.

Chemical Aspects. Some Chemical Aspects of Welding, J. R. Booer. Engineering, vol. 117, no. 3033, Feb. 15, 1924, pp. 221-223, 2 figs. Theory and practice in ferrous and non-ferrous work; problems in oxidation and reduction. See also Chem. Trade Jl. & Chem. Engr., vol. 74, no. 1917, Feb. 15, 1924, pp. 189-191; Chem. Age (Lond.), vol. 10, no. 244, Feb. 16, 1924, pp. 164-165; and Welding Engr., vol. 9, nos. 4 and 5, Apr. and May 1924, pp. 29, 44, 46 and 29, 32-33.

Electric. See ELECTRIC WELDING; ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE.

Equipment. Welding Equipment in Service. Can. Machy., vol. 32, no. 8, Aug. 21, 1924, pp. 26-27 and 46-47, 1 fig. Describes proper methods for setting up tank outfit, crank open valves, averting trouble, release adjusting screws, regulators carefully made, disconnecting equipment, etc.

Flexible and Rigid. Flexible and Rigid Welding, J. C. Lincoln. Can. Machy, vol. 32, no. 31, July 31, 1924, pp. 26-27, 3 figs. Discusses kind of metal in weld after passing through arc; structure; flexible and rigid methods; cooling strain.

Fluxes and Slags in. Fluxes and Slags in Welding, W. Spraragen. Foundry Trade Jl., vol. 29, no. 405, May 22, 1924, pp. 414-416. Deals with fluxes in electric-arc and gas welding, and welding of monel metal and cast iron. Abridged from paper read at symposium arranged by Faraday Soc., Inst. Metals, Inst. British Foundrymen, and Non-Ferrous Research Assn. See also Am. Welding Soc.—Jl., vol. 3, no. 4, Apr. 1924, pp. 36-47.

Fusion, Methods and Problems. Fusion Welding, C. B. Bellis. Chem. & Met. Eng., vol. 30, no. 1, Jan. 7, 1924, p. 17. Varieties of fusion welding; problems still to be solved.

Iron Castings. See IRON CASTINGS, Welding.

Locomotive Practice. See LOCOMOTIVES, Welding Practice; RAILWAY REPAIR SHOPS, Locomotive.

Locomotive Tire Flanges. See LOCOMOTIVES, Tire-Flange Welding.

Manganese Steel. See MANGANESE STEEL, Welding.

Methods. Welding Methods. Werkstattstechnik, vol. 18, no. 22, Nov. 15, 1924, pp. 633-676, 155 figs. A series of articles by different authors on autogenous welding, welding in forge shop, welding of castings, arc welding and electrode material, electric spot welding, autogenous aluminum welding, copper welding, etc.

Monel Metal. See MONEL METAL, Welding.

Multi-Throw Crank. Butt-welding Multi-throw Cranks, A. M. Lount. Machy. (Lond.), vol. 25, no. 631, Oct. 30, 1924, pp. 143-144, 2 figs. Difficulties involved in production; sequence of operations; welding section together; method of inspection.

Oil Refineries. Welding Practice in an Oil Refinery, C. R. Price. Am. Welding Soc.—Jl., vol. 3, no. 7, July 1924, pp. 20-30, 13 figs. Discusses application of welding to pipe, boiler and tank work, structural iron and general repairs, and gives examples of practical work.

Oxy-Acetylene. See OXY-ACETYLENE WELDING.

Pipe. See PIPE, Welding; PIPE, CAST IRON, Welding.

Pipe Lines. See PIPE LINES, Welding

Properties of Steel in. Properties of Steel in

Welding, F. C. Thompson. Welding Engr., vol. 9, no. 7, July 1924, pp. 17-20, 5 figs. Effect of heat treatment on ductility and toughness; tensile properties of deposited metals; effect of different elements. Abstract of paper read before Instn. Welding Engrs.

Rail Joints. See RAILS, Joints.

Rails. See RAILS, Welding.

Railway Crossings. See RAILWAY TRACK, Welding.

Thermit. See THERMIT WELDING.

Welding Metal, High-Carbon. High Carbon Welding Metal, C. A. McCune. Am. Welding Soc.—Jl., vol. 3, no. 3, Mar. 1924, pp. 22-33, 16 figs. Results of experiments made in connection with high-carbon welding materials.

Worn Machinery Parts Reclamation. Reclaiming Worn and Broken Parts of Machinery, T. T. Copeland. Am. Welding Soc.—Jl., vol. 3, no. 12, Dec. 1924, pp. 27-35, 6 figs. Suggestions as to maintenance and safety operation of equipment used in welding; different grades of welding wire; phosphorus and sulphur as impurities; results of experiments; pipe welding; preheating annealing; etc.

WELDS

Flexibility vs. Rigidity. Design of Welds—Flexibility Versus Rigidity. Am. Welding Soc.—Jl., vol. 3, no. 4, Apr. 1924, pp. 15-27, 3 figs. Contains five short papers giving views of experts in each of the welding fields as to whether a weld in a structure should be designed more rigid or flexible than parts which it joins: Carbon Arc Welding, J. C. Lincoln; Gas Welding, S. W. Miller; Metal Arc Welding, C. J. Holslag; Resistance Welding, H. A. Woofter; and Thermit Welding, J. H. Deppeler.

Welded Joints, Efficiency of. How Efficient Are Welded Joints?, E. E. Michaels. Contract Rec. & Eng. Rev., vol. 38, no. 14, Apr. 2, 1924, pp. 327-329, 4 figs. Tests conducted by Chicago Bridge & Iron Works to determine efficiencies of various types of joints; results obtained provide excellent design data.

Welded Joints, Testing. A Cheap, Reliable and Exhaustive Method of Testing Welded Joints, A. Menetrier. Am. Welding Soc.—Jl., vol. 3, no. 1, Jan. 1924, pp. 13-17, 6 figs. Results of series of shock bending tests which have proved of great value for investigation of relative strength of mild steel welded joints performed with three different types of electrodes.

WELFARE WORK

International. The International Development of the Industrial Welfare or Personnel Movement. Int. Labour Rev., vol. 10, no. 1, July 1924, pp. 48-58. Main lines of development in countries represented at international conference and principles involved.

Mines. See MINES, Welfare Work.

National Cash Register Co. Plant. Human Factors at Cash Register Plant. Iron Age, vol. 113, no. 12, Mar. 20, 1924, pp. 843-847, 10 figs. Evolution of welfare work of Nat. Cash Register Co. at Dayton, Ohio; division of profits with resultant low labor turnover; apprenticeship in cooperation with engineering schools.

Shop Hospitals. See HEALTH, Industrial Health-Service Plan.

WELLS

Artesian. The "Artesian Well" as a Potential Source of Danger, F. D. Leach. Am. Jl. Pub. Health, vol. 14, no. 10, Oct. 1924, pp. 827-831, 5 figs. Results of study to determine causative factors of high incidence of typhoid fever and other water-borne diseases prevalent in Manila, P. I.

Drilling and Operation. Drilling and Operation of Deep Wells, C. F. Cole. Can. Engr., vol. 46, no. 14, Apr. 1, 1924, pp. 397-398. Factors to be considered when locating deep wells; mechanical features of drilling and development; air-lift and centrifugal pumps. From paper read before Am. Water Wks. Assn., North Carolina Sec.

WHARVES

Creosoted Timber Construction. Creosoted Timber in Wharf Construction, C. M. Taylor. World Ports, vol. 12, no. 4, Feb. 1924, pp. 73-86 and (discussion) 86-89, 8 figs. Reduction of fire risk; protection for concrete structures; comparison with steel construction; creosoted wood-block floors; framing timbers before treatment; etc.

Reinforced-Concrete. Reinforced Concrete Wharf at Newcastle. Concrete & Constructional Eng., vol. 19, no. 8, Aug. 1924, pp. 506-511, 7 figs. Wharf is carried on reinforced concrete piles, spaced 12 ft. longitudinally and 10 ft. transversely; wharf forms extension of Norway Wharf used by Bergen and Newcastle steamers; feature of construction was large amount of pre-cast work introduced in form of wallings and braces.

Steel-Pile. Steel Sheetpiling in Salt Water at Havana, Cuba. Eng. News-Rec., vol. 92, no. 26, June 26, 1924, pp. 1086-1088, 4 figs. Particulars of new bulkhead for wharf consisting of steel sheetpiling topped with a concrete wall which extends 2 ft. below water line; steel piling given two coats of red oxide paint; rock is channeled to receive piles. Notes on construction methods and plant.

Tropical Countries. Some Tropical Wharf Construction, T. H. Barnes. Boston Soc. Civil Engrs.—Jl., vol. 11, no. 9, Nov. 1924, pp. 385-416 and (discussion) 426-442, 6 figs. Particulars of construction and maintenance of some wharves in Central and South America.

Wing-Pile Construction System. Wingpiles for Wharves and Retaining Walls, L. Besnard. Contract Rec. & Eng. Rev., vol. 38, no. 16, Apr. 16, 1924, pp. 379-383, 5 figs. Coignet-Ravier system of construction employing reinforced-concrete piles of T-section with pin-jointed ties anchored to ground.

WHITE METALS. See LEAD ALLOYS, White Metals.

WINCHES

Motorship-Cargo. The Electric Cargo Winch for Shipboard Service, A. O. Loomis. Elec. Jl., vol. 21, no. 12, Dec. 1924, pp. 568-573, 8 figs. See also Pac. Mar. Rev., vol. 21, no. 12, Dec. 1924, pp. 638-641, 7 figs. Design of winch; methods of handling cargo; personnel; winch motors; brakes; manually operated cam controllers; winches on motorships William Penn, Californian, Seekonk and Challenger; electric vs. steam-driven auxiliaries.

WIND

Conditions, Study of. Study of Wind Conditions (Die Erforschung der Windverhältnisse), M. Rosenmüller. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 8, Feb. 23, 1924, pp. 177-179, 5 figs. Study of constancy of wind based on meteorological data; suggestions for seeking good exposures; choice of favorable site for erection of wind motor and the requisite measuring instruments.

Effect on Structures. See STRUCTURES, Effect of Wind on.

German Statistics. Critical Notes on Wind Statistics in Germany and the Study of Weather from a Technical Standpoint (Kritische Bemerkungen zur Windstatistik in Deutschland und zur Kenntnis

vom Wetter bei Technikern), C. Kassner. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 8, Feb. 23, 1924, pp. 179-180. Deals with numerous relations between meteorology and technology and points out that weather statistics should not be employed without some knowledge of meteorology.

WIND POWER

Electricity and. See ELECTRIC GENERATORS, Wind-Driven.

WIND TUNNELS

Motive Power for. Determination of the Motive Power Necessary for the Operation of a Wind Tunnel (Expériences sur la détermination de la puissance motrice nécessaire au fonctionnement d'une souffierie), S. Ziembinski. Aérophile, vol. 32, no. 15-16, Aug. 1-15, 1924, pp. 246-250, 4 figs. Discusses operations at Eiffel laboratory tunnel; experiments with flow of air through nozzles, velocity of tunnel air.

Motors for. See ELECTRIC MOTORS, A.C., Model Air Propellers.

Resistance of Spheres. The Resistance of Spheres in Wind Tunnels and in Air, D. L. Bacon and E. G. Reid. U. S. Nat. Advisory Committee for Aeronautics—Report, no. 185, 1924, 21 pp., 18 figs. Satisfactory confirmation of Reynolds law has been accomplished, effect of means of support determined, range of experiment greatly extended by work in new variable-density tunnel, and effects of turbulence investigated by work in tunnels and by towing and dropping tests in free air.

Toronto, Canada. Aeronautical Research. Can. Engr., vol. 46, no. 8, Feb. 19, 1924, pp. 255-256, 2 figs. Describes wind channel opened in Aerodynamics Laboratory, Univ. of Toronto, for testing airplane models; first plant in Canada.

WINDING ENGINES

Calculation. Design, Calculation and Dimensioning of Skip Hoisting Plants (Ueber den Aufbau, die Berechnung und die Bemessung von Gefässförderungen), C. M. Roeren. Siemens-Zeit., vol. 4, nos. 7 and 8, July and Aug. 1924, pp. 222-228 and 268-273, 16 figs. Discusses types of skips and their weight; cables, their selection, calculation, and operation; arrangement of pulleys; design of mechanical part of series of winding engines.

Drum. Winding Engines with Conical Bicylindric Drums (Les machines d'extraction à tambours bicylindroconiques), M. Lahoussay. Revue de l'Industrie Minérale, nos. 83, 84, and 85, June 1, 15, and July 1, 1924, pp. 271-288, 303-313, and 327-340, 36 figs. Discusses types of winding engines and their calculation; design and construction of new winding engine for 500 to 600 m. depth of Compagnies Houillieres du Nord and advantages of conical bicylindrical drums; other types of conical engines, with two layers of cable, drums in two parts, management of cables.

Electric. A New Type of Electric Winder. Power Engr., vol. 19, no. 223, Oct. 1924, pp. 386-388, 4 figs. Stubbs-Perry winding plant at Harworth main coal mine is first of its kind; geared steam-turbine plant drives tandem generators and flywheel, while winding drum is also driven through gearing by two motors.

Electric Winder Calculations, A. Russell. Colliery Engr., vol. 1, no. 3, May 1924, pp. 149-151, 1 fig. Determination of power and size of electric winding engine.

Electric Winders, D. Weir. Colliery Guardian, vol. 127, no. 3298, Mar. 14, 1924, pp. 677-678, 1 fig. Advantages; size of drums; the Lancashire and Wembley installations; controllers, brake gear, load equalization. Abstract of paper read before Manchester Geol. & Min. Soc.

Electric Winding Engines for Medium Depths (Les machines d'extraction électriques pour profondeurs moyennes), M. Lahoussay. Revue de l'Industrie Minérale, nos. 88 and 89, Aug. 15 and Sept. 1, 1924, pp. 402-422 and 428-444, 24 figs. Discusses electric equipment of winding engines, including Ward-Leonard, comparative cost per year of operating various types, construction and operation. Details of winding engines in mines of Nord and Pas-de-Calais.

420-H.P. Electric Winder. Engineering, vol. 117, no. 3046, May 16, 1924, pp. 633-635, 3 figs. Single-drum colliery winder exhibited at the Brit. Empire Exhibition, by Vickers, Ltd.

Electric, Controller for. See ELECTRIC LOCOMOTIVES, Direct-Current.

Mines. Electric Winding-Engines, D. Weir. Instn. Min. Engrs.—Trans., vol. 67, part 2, May 1924, pp. 129-143 and (discussion) 143-148, 11 figs. Advantages of electric drive for winders; description of different types of winders; controllers; etc. Winding diagrams.

WINDMILLS

Control Methods. A New Control Method for Windmills (Ein neues Regelverfahren für Windkraftwerke), R. Bosselmann. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 3, Jan. 19, 1924, pp. 48-52, 10 figs. Describes two methods of control: one indicating most favorable vane speed for prevailing velocity of wind and making possible the use of dynamos for uniform number of revolutions; the other automatically regulates voltage of system, and does away with battery switch operation and all switchboard attendance.

Design. Wind Power (Windkraft), P. v. d. Sterr. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 5, Feb. 2, 1924, pp. 106-108, 7 figs. Method is suggested of calculating coefficient of variability; attention is called to fact that efficiency of most important parts of windmill installation plays an entirely different rôle than is otherwise the case, and other types of machinery are required.

Electricity Supply by. Modern Installations for the Generation of Electricity by Wind Power (Neuere Anlagen zur Erzeugung von Elektrizität durch Windkraft), L. Riefstahl. Praktischer Maschinen-Konstrukteur, vol. 57, no. 6, Feb. 15, 1924, pp. 49-51, 4 figs. Useful field of wind-electric plants; AEG (German Gen. Elec.) system and other plants carried according to this system; economic aspects.

Turning of Windmills Into the Wind (Die Einstellung der Windräder), H. Baudisch. Elektrotechnik u. Maschinenbau, vol. 42, no. 42, Oct. 19, 1924, pp. 617-620, 3 figs. To utilize windmills to best advantage, as is desirable for generation of electric energy, it is necessary to place wheel always directly into wind; this is being accomplished on small wheels with a simple rudder vane and on large wheels by a small auxiliary wheel; simple formulas for designing this rudder or auxiliary wheel of a size adequate to size of wheel.

Farm Electric Plants. Wind Power for Farm Electric Plants, F. J. Pancratz. Mech. Eng., vol. 46, no. 11, Nov. 1924, pp. 675-680 and (discussion) 680-682, 10 figs. Test data on 15-ft. wheel; losses due to air drag; best size of wheel for farm electric-light plants; combination plant for generating electric power and pumping.

WINDOWS

Air Leakage Around Openings. Air Leakage Around Window Openings, C. C. Schrader. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 30, no. 6, June 1924, pp. 465-474, 8 figs. Deals with effect of increasing width of stile, that is, increasing clearance.

WIRE

Annealing. See ELECTRIC FURNACES, Annealing; FURNACES, ANNEALING, Steel Wire.

Copper. Copper Wire Production, S. Cowper-Coles. Electrician, vol. 92, no. 2402, May 30, 1924, pp. 658-660, 9 figs. Notes on electrolytic methods of manufacture.

Relation between the Tensile Strength and the Electrical Resistivity of Commercially Pure Copper, W. E. Alkins. Inst. Metals—Advance Paper, no. 1, for meeting Mar. 12-13, 1924, 5 pp., 1 fig. Investigation of relationship between tensile strength and increase in resistivity of commercially pure copper in form of wire; results.

The Manufacture of Copper Wire, W. J. Pettis. Metal Industry (N. Y.), vol. 22, no. 8, Aug. 1924, pp. 309-310, 4 figs. Describes operations from wire bar to finished wire.

See also Trolley.

Drawing. See WIRE DRAWING.

Forming Machine. Making Wrench Handles From Wire. Machy. (N. Y.), vol. 30, no. 9, May 1924, pp. 696-699, 6 figs. Practice followed in bending large-diameter stock to variety of shapes in four-slide wire-forming machine.

Hoisting Cable, Testing. Bending Test of Wire for Winding-Engine Cable (Die Hin- und Her-Biegeprobe für Förderseildrähte), H. Herbst. Glückauf, vol. 60, no. 48, Nov. 29, 1924, pp. 1111-1120, 8 figs. Determination of new bending numbers for wires, which take into account tensile strengths and zinc coating.

Insulation of. Insulation of Coil-Wound Wires (Die Isolation spulengewickelter Drähte), U. Retzow. Elektrotechnik u. Maschinenbau, vol. 42, no. 28, July 13, 1924, pp. 442-446, 2 figs. Discusses effect of temperature and moisture on insulation, enamelled wire, impregnating processes and impregnating in vacuo.

Steel. Tensile Properties of Some Steel Wires at Liquid Air Temperatures, W. P. Sykes. Am. Soc. for Steel Treating—Trans., vol. 6, no. 2, Aug. 1924, pp. 138-144, 2 figs. Compares tensile properties of low-carbon, nickel, and chrome-molybdenum steels at room temperature and that of liquid air (— 180 deg. cent.).

Steel, Heat-Treating. See ELECTRIC FURNACES, Heat-Treating.

Stretched, Torsion Modulus of. Changes of the Torsion Modulus of Eureka Wire when Stretched (Ueber die Aenderungen des Torsionsmoduls eines Eurekadrahtes durch Ziehen), G. B. Deodhar. Zeit. für Physik, vol. 21, no. 4, Feb. 16, 1924, pp. 247-251, 4 figs. Torsion modulus of this metal in wire form was determined according to known methods; since stretching influences torsion modulus in various ways, study was made to find how far different factors alter elasticity of wire, and whether any relationship exists between them.

Telephone. Iron Wire in Telephone Work, P. K. Higgins. Telephone Engr., vol. 28, no. 11, Nov. 1924, pp. 21-24. Properties of iron wire for telephone service, manufacturing methods, specifications for galvanizing tests, grades of iron wire, proper sag for line wires, and proper clearance from trees and foreign wires.

Trolley, Manufacture of. Trolley Wire in the Making, J. Williams. Am. Mach., vol. 61, no. 1, July 3, 1924, pp. 21-22, 5 figs. Describes making of trolley wire, from cast ingot into a length of one mile.

Tungsten, Rigidity at Incandescent Temperatures. The Simple Rigidity of a Drawn Tungsten Wire at Incandescent Temperatures, W. Schriever. Jl. Optical Soc. Am. & Rev. of Sci. Instruments, vol. 8, no. 2, Feb. 1924, pp. 255-265, 4 figs. Describes apparatus used and procedure in determination of rigidity of a 10-mil drawn tungsten wire to 2000 deg. K.

WIRE DRAWING

Effect on Steel Properties. Wire Drawing and Properties of the Steel, G. F. Comstock. Iron Age, vol. 114, nos. 11 and 12; Sept. 11 and 18, 1924, pp. 621-624 and 705-707, 24 figs. Some of the changes due to progressive cold drawing. Static and structural effects. Analogy with copper. Changes due to progressive drawing traced by photomicrographic analysis. Study of grain size.

Filaments. A Method of Drawing Metallic Filaments and a Discussion of Their Properties and Uses, G. F. Taylor. Physical Rev., vol. 23, no. 5, May 1924, pp. 655-660, 1 fig. Description of process of drawing wire of extreme fineness. Metallic filaments made by this process have been used for resistance thermometers, thermocouples, galvanometer suspensions, and hair lines for eye pieces of telescopes, and their use in micropiles, bolometers and moving coil of both direct and alternating current galvanometers is suggested.

Machines for. British Wire-drawing and Wire-working Machinery. Serial article in Engineer, vol. 138, nos. 3577-3599, July 18-Dec. 19, 1924, 158 figs. July 18: Manufacture of wire rods. July 25: Layout of factories; wire drawing. Aug. 1: Design and production of dies. Aug. 8: Wire-drawing blocks. Aug. 15: Continuous wire-drawing machines. Aug. 22: Safety-pin making. Aug. 29: Wire-netting machinery. Sept. 5, 19 and 26: Wire factories. Oct. 3: Barbed-wire machines. Oct. 10: Electric cable-making. Oct. 17: High-speed stranding machines. Oct. 31: Straightening and cutting-off machines. Nov. 7: Pin-making machines. Nov. 21: Nail and rivet-making machines. Nov. 28: Needle making. Dec. 5: Wire-weaving looms. Dec. 12: Miscellaneous machines. Dec. 19: Large wire-drawing bench.

WIRE ROPE

Care of. The Wear and the Care of Wire Rope, W. Constable. Am. Contractor, vol. 45, no. 25, June 21, 1924, pp. 25-27, 9 figs. Explains right and wrong uses of wire rope and practices conducive to longevity are suggested.

Economical Application of. Wire Ropes, T. A. Taylor. Can. Min. Jl., vol. 45, no. 27, July 4, 1924, pp. 643-647, 8 figs. See also Colliery Engr., vol. 1, no. 2, Apr. 1924, pp. 71-74, 9 figs. Principles governing economical application of steel-wire mining ropes both for winding and haulage purposes. Various types of ropes available and state of development to which each of these have been brought; reason for choice of most suitable rope under given circumstances; safety factor obtainable.

Hoisting. Wire Hoisting Ropes for Lifts, G. H. Roberts. Mech. Wld., vol. 75, no. 1940, Mar. 7, 1924, pp. 145-146, 3 figs. Discusses features of primary importance for efficient and economical working of lift ropes; rope life, and conditions of a rope's deterioration.

Manufacture. How Wire Rope Is Manufactured and Used and How Its Life May Be Prolonged in Mine Service, L. W. Bevan. Coal Age, vol. 25, no. 24, June 12, 1924, pp. 872-875, 5 figs. Physical and chemical tests constantly check wire-drawing process; saturated core acts as cushion and lubricant; care of ropes and their application to mine-hoist problems.

Testing. Testing Wire and Wire Ropes, R. G. Batson. Testing, vol. 1, no. 1, Jan. 1924, pp. 7-22, 6 figs. Notes on fatigue testing and fatigue tests on stranded cables, results of which are given in tabular form.

WIRELESS TELEGRAPHY AND TELEPHONY.

See RADIOTELEGRAPHY; RADIOTELEPHONY.

WOOD

Automobile Bodies. See AUTOMOBILES, Wood for Bodies.

Balsa. See BALSA WOOD.

Cellulose Determination. Modified Method for Determining Cellulose in Wood, G. J. Ritter. Indus. & Eng. Chem., vol. 16, no. 9, Sept. 1924, pp. 947-948. Modification of present method of preparing cellulose, so as to minimize, if possible, troublesome features.

Distillation. How the Wood Distiller Dodges Corrosion. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 52-53. Outline of general processes involved in destructive distillation of wood, showing points at which corrosion problems occur. Action of hot acetic acid solutions and vapors makes it necessary to use copper and wood for many of the operations.

Drying. Wood and Drying Processes (Das Holz und seine Trocknung), M. Wimplinger. Praktische Maschinen-Konstrukteur, vol. 57, no. 28, July 29, 1924, pp. 401-403 and 447-450, 15 figs. Discusses structure, composition, and properties of wood; production and use in various countries; causes of shrinkage, warping and crack formation in drying; advantages of drying; drying plants; cost of drying.

See also DRYING, Vacuum; DRYING PLANTS.

Durability and Composition. The Relation between Durability and Chemical Composition in Wood, L. F. Hawley, L. C. Fleck and C. A. Richards. Indus. & Eng. Chem., vol. 16, no. 7, July 1924, pp. 699-700. Discusses connection between durability and chemical composition and applies toxicity tests to determine it.

Fungi in. Effect of Kiln Drying, Steaming, and Air Seasoning on Certain Fungi in Wood, E. E. Hubert. U. S. Dept. Agriculture—Bul. no. 1262, Aug. 1924, 20 pp., 13 figs. partly on supp. plates. Details of study to determine whether fungi in lumber are killed under ordinary commercial kiln conditions and steaming processes and to gain some idea of minimum time and temperature limits necessary to kill these organisms. Results of tests.

Plywood. See AIRCRAFT CONSTRUCTION MATERIALS, Plywood.

Preservation. See WOOD PRESERVATION.

Pulp. See PAPER MANUFACTURE, Wood-Pulp Production; WOOD PULP.

Soft, Microscopic Structure. Microscopic Structure of Softwood. Eng. News-Rec., vol. 92, no. 20, May 15, 1924, p. 861, 1 fig. Presents drawing of cell structure of minute block of softwood.

Testing Machine for. A Universal Static and Kinetic Wood Testing Machine, Developed to Meet the Requirements of the French Aeronautical Standardization Committee, B. C. Anderson. Testing, vol. 1, no. 1, Jan. 1924, pp. 72-79, 7 figs. New machine is used first for static tests of wood in bending, in compression, in tension, by splitting and for hardness, and secondly, for carrying out kinetic tests in transverse shock application.

Varnish-Drying Troubles. Causes of Surface Checks in Wood in Varnish-Drying Rooms, H. D. Tiemann. Soc. Automotive Engrs.—Jl., vol. 15, no. 5, Nov. 1924, pp. 431-436, 11 figs. Description of how water is contained in wood, including details of wood structure, and action of moisture in causing swelling and subsequent shrinkage; describes how wood dries and explains "set" and "casehardening"; causes of varnish-drying trouble.

WOOD PRESERVATION

A. R. E. A. Report. Wood Preservation. Am. Ry. Eng. Assn.—Bul., vol. 26, no. 270, Oct. 1924, pp. 65-129, 44 figs. Describes float test of residue, service test records, fence post tests, treatment with mixture of creosote and petroleum, treatment with mixture of zinc chloride and petroleum, and effect of preservatives on inflammability of wood.

Creosote, Specifications for. See RAILWAY TIES, Preservative Treatment.

Death-Watch Beetle, Protection Against. The Treatment of the Death-Watch Beetle in Timber Roofs, H. Maxwell-Leroy. Roy. Soc. Arts—Jl., vol. 72, no. 3720, Mar. 7, 1924, pp. 260-266 and (discussion) 266-270. Essential facts of insect's life and habits, and precautions that can be taken.

Freight-Car Timber. See CARS, FREIGHT, Timber Preservation for.

Marine Borers. National Research Council Reports Enormous Damage to Marine Structures by Borers. Wood Preserving News, vol. 2, no. 5, May 1924, pp. 66-71, 5 figs. Expert evidence that important marine structures must be protected against attack of borers whose presence has been detected by test boards and whose activities may be checked by timber preservation. Extracted from report of A. R. E. A. sub-committee which has coöperated with and assisted Nat. Research Council.

Mine Timber. Wood Preservation and Reforestation Advances Reviewed by American Mine Institute. Coal Age, vol. 25, no. 14, Apr. 3, 1924, pp. 491-492, 4 figs. Discusses three methods whereby present situation may be at least partially relieved, namely, (1) use of less timber in mining; (2) preservation through chemical treatment of timber used; and (3) employment of various substitutes for timber. Based on round-table discussion at Am. Inst. Min. & Met. Engrs.

See also MINE TIMBERING, Preservation.

Paint as Preservative. Does Paint Preserve Wood?, H. D. Tiemann. Sci. Am., vol. 130, no. 5, May 1924, pp. 314-315, 6 figs. Points out that paint is not proof against gradual absorption of moisture and will not prevent swelling or shrinkage, but it retards rate of absorption or loss of moisture through surface, thus giving time for partial equalization of moisture and reduction of moisture gradient within piece.

Poles. See POLES, WOODEN, Preservation.

Preservatives. Preservation of Wood (Ueber die Konservierung des Holzes), M. Sedlaczek. Kunststoffe, vol. 14, nos. 4, 5, 6, 7, and 9, Apr., May, June, July, and Sept. 1924, pp. 49-50, 68-71, 84-86, 103-105, and 134-135. Discusses colloidal impregnation agents, mineral coatings, inorganic compounds, including mercury and arsenic compounds, magnesium-zinc salts. Organic compounds, including tar oils, phenols, nitrocompounds. Dyeing and staining of wood. Processes of further manufacture of wood, cork, etc.

Puncturing Method. Improvement of Wood Treatment by Puncturing Method (Verbesserung der Holztränkung durch Anstechverfahren), Rob. Novotny. Zeit. des Vereines deutscher Ingenieure, vol. 68, no. 49, Dec. 6, 1924, pp. 1273-1275, 7 figs. Discusses different types of German and American incising machines; successful results with incising machines in practice; points out that there is only slight loss in strength of wood by use of process.

Railway Ties. See RAILWAY TIES, Preservative Treatment.

South Africa. Experimental Timber Preservation in South Africa, H. B. Stephens. S. African Jl. Industries, vol. 7, nos. 10 and 11, Oct. and Nov. 1924, pp. 651-656 and 736-744, 16 figs. Principal timber-destroying agencies, types of timbers to be treated, preservatives, methods of preservative treatment, preservative plant at Forest Dept. Experimental Station at Pretoria, extra service yielded by treated timbers, importance of service tests, special experiments, etc.

Tie-Treating Plant. See RAILWAY TIES, Preservative Treatment.

Treatment. Wood Preservation. Am. Ry. Eng. Assn.—Bul., vol. 25, no. 265, Mar. 1924, pp. 845-1066, 67 figs. Report of committee giving creosote specifications, service test records, marine piling research, preservative treatment for signal trunking and capping, creosote mixture with other oils, zinc-petroleum mixture; also report of subcommittee on marine piling investigations.

WOOD PULP

[See also PAPER MANUFACTURE, Pulp Manufacture, etc.]

Grinders. Modern Wood Grinding Machines, F. Hoyer. Eng. Progress, vol. 5, no. 1, Jan. 1924, pp. 12-17, 14 figs. Wood-dressing machines; magazine grinders; large press grinders, assorting and refining machines; dehydrating machines; recovery of waste water.

Manufacture, Corrosion Problems in. Corrosion Problems in the Pulp Plant. Chem. & Met. Eng., vol. 31, no. 2, July 14, 1924, pp. 54-56, 2 figs. Survey of corrosion problems in production of chemical wood pulp, and the various materials used in combating them.

WOODWORKING MACHINERY

Boring Machines. See BORING MACHINES, multiple-Spindle; Semi-Automatic Chain Cutter.

British Empire Exhibition. Wood-Working Machinery. Engineer, vol. 137, no. 3569, May 23, 1924, pp. 560-563, 10 figs. Describes automatic hand-hole boring machine, automatic two-color box printing machine, hand-feed planer, saws and saw benches, etc.

See also MACHINE TOOLS, British Empire Exhibition.

Electric Drive. Electric Drive of Wood Working Machines (Elektrischer Antrieb von Holzbearbeitungsmaschinen), W. Kraft. Maschinenbau, vol. 3, no. 30, Dec. 24, 1924, pp. 1166-1171, 12 figs. Driving conditions of wood-working machines; group and individual drives; motors.

See also ELECTRIC MOTORS, A.C., High-Speed; Wood and Metal-Working Machinery.

Mortising and Boring Machine. Wood-Working Mortising and Boring Machine. Engineering, vol. 117, no. 3035, Feb. 29, 1924, pp. 268-269, 3 figs. Describes combined chain and hollow-chisel machine for mortising which can also be used for boring, made by Wadkin & Co., Leicester, England.

Planers. High Efficiency Wood Planing Machines (Hochleistungshobelmaschinen), O. Schlegel. Praktische Maschinen-Konstrukteur, vol. 57, no. 24, July 1, 1924, pp. 343-344, 1 fig. Description of construction of machine for planing floor boards on all four sides simultaneously.

High-Speed Wood-Planing Machine. Engineering, vol. 117, no. 3040, Apr. 4, 1924, pp. 445-446, 6 figs. partly on p. 436. Planning machine for production of flooring boards and other repetitive planing work, capable of completely planing timber up to 12 in. by 5 in. in section at rate of 300 ft. per min.

Safety Precautions. Safety Precautions for Woodworking Machines. Foundry Trade Jl., vol. 30, no. 416, Aug. 7, 1924, pp. 121-124, 14 figs. Abstract of precautions published in Safety Pamphlet No. 8, by H. M. Stationery Office, Imperial House, Kingsway, Lond., Eng.

Tenoning Machines. See BORING MACHINES, Multiple-Spindle.

WOODWORKING PLANTS

Lumber Conservation. Ford Upsets Precedents in Interest of Lumber Conservation. Automotive Industries, vol. 50, no. 16, Apr. 17, 1924, pp. 866-867, 4 figs. System employed at saw mills and woodworking plants of Ford Motor Co.; body parts are cut from unedged green slabs and are kiln-dried afterward; crooked logs, swell at butt and even branches 4 in. or more in diam., formerly discarded, are now utilized effectively.

WOOL

Conditioning. Conditioning, C. O. Clark. Textile Inst.—Jl., vol. 15, no. 7, July 1924, pp. 250-257. Discusses chemical and physical properties in relation to conditioning, conditioning during carding, drawing and spinning, conditioning of yarns and pieces.

Dyeing. See DYEING, Wool.

Hygroscopicity. The Hygroscopic Capacity of Wool in Different Forms and Its Dependence on Atmospheric Humidity and Other Factors, S. A. Shorter and W. J. Hall. Textile Inst.—Jl., vol. 15, no. 6, June 1924, pp. T305-T327, 6 figs. Discusses variation and measurement of atmospheric humidity, effect of oil on hygroscopic capacity, etc.

Industry, Progress in. Recent Progress in the Wool Industries, A. F. Barker. Roy. Soc. Arts—Jl., vol. 72, nos. 3755 and 3756, Nov. 7 and 14, 1924, pp. 861-869 and 873-877, 7 figs. Nov. 7: Raw materials. Nov. 14: Manufacturing processes.

Insurance and. See INSURANCE, Workmen's Compensation and.

WORKMEN'S COMPENSATION

Employer's Liability. Workmen's Compensation, G. F. Tyler. Machy. Market, nos. 1222, 1223, and 1224, Apr. 4, 11, and 18, 1924, pp. 29-30, 25-26, and 23-24. Liability of an employer in respect of personal injuries to his workmen.

Family Allowances. Family Allowances in French Industry, R. Picard. Int. Labour Rev., vol. 9, no. 2, Feb. 1924, pp. 161-176. Since 1916 constantly increasing number of industrial undertakings have paid family allowances to their workers; in order to equalize expenditure thus involved they have formed compensation funds, to which they pay contributions in proportion to their staff or wages bill; family allowances are then paid by compensation funds; discusses constitution of funds and manner in which allowances are calculated.

Laws, Mexico. Comparison of Workmen's Compensation Laws of the Mexican States, E. C. Yohe. Monthly Labor Rev., vol. 18, no. 2, Feb. 1924, pp. 1-10. Study and comparison of principal features of workmen's compensation laws of 15 Mexican States.

Length of Service. Compensating Employees for Length of Service. Soc. Indus. Engrs.—Bul, vol. 6, no. 3, Mar. 1924, pp. 6-8. Experience of a number of firms in dealing with the question of what is best method of compensating employees for length of service, especially when they are on piece rates and are engaged in work at which their speed and consequent earning power decreases with age.

Metal Mines, Insurance for. Development of Workmen's Compensation Insurance for Metal Mines, B. O. Pickard. U. S. Bur. Mines—Reports of Investigations, no. 2590, Mar. 1924, 6 pp. Briefly reviews origin of accident compensation, gives digest of State compensation laws, and describes types of insurance carriers.

Ontario System. Compensation for Accidents to Workmen. Contract Rec., vol. 38, no. 42, Oct. 15, 1924, pp. 1021-1024. Synopsis of system in operation in Ontario for recompensing injured employees.

Social Insurance and. Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 18, no. 5, May 1924, pp. 198-202. Operations of workmen's sick and death benefit fund of United States, 1923.

WORKS COUNCILS. See EMPLOYEES' REPRESENTATION, Works Councils.

WORLD POWER CONFERENCE. See POWER, World Power Conference.

WROUGHT IRON

[See also IRON, Direct Production from Ore; Wrought.]

Strength at High Temperatures. See IRON AND STEEL, Strength at High-Temperatures.

X

X-RAYS

Absorption Spectra. On Absorption Spectra in the X-Ray Region (Ueber die Absorptionsspektren im Röntgengebiet), D. Coster. Zeit. für Physik, vol. 25, no. 2, July 2, 1924, pp. 83-98, 3 figs. New measurements for Ti, V, Cr and Mn, Sn, Sb, etc., showing dependence of fine structure on chemical state of elements.

Testing Materials by Means of X-Rays (Materialprüfung mittels Röntgenstrahlen), R. Glocker. Zeit. für Metallkunde, vol. 16, no. 5, May 1924, pp. 180-182, 4 figs. Discusses application of interference process giving details of composition of structure, and space lattice; new observations of crystal arrangement in electrolytic sheet metal; objects and limits of X-ray metallography.

Applications. X-Rays and Their Applications (I raggi x e le loro applicazioni), L. G. Calcagni. Rivista Marittima, Suppl. to Mar. 1924, pp. 3-60, 22 figs. Discusses discovery, nature and properties, tubes for production, diffraction and interference, theory and structure of crystals; spectra at high frequency, etc.

Chemical Analysis by Means of. Quantitative Chemical Aanalysis By Means of X-Rays (Quantitative chemische Analyse durch Röntgenstrahlen), H. Stintzing. Zeit. für Physikalische Chemie, vol. 108, no. 102, 1924, pp. 51-69, 3 figs. First and a new method of quantitative analysis through Röntgen emission spectra; possibility of extending chemical anaylsis to elements of low atomic weight; other methods of chemical analysis by means of X-rays. See also succeeding article by same author, entitled High-Vacuum Measuring Instruments (Hochvakuum-Messinstrumente), pp. 70-81, 2 figs.

Coal Analysis. See COAL, X-Ray Analysis.

Condensers. Theory of Condensers for the Production of High D.C. Tension for X-ray Purposes (Beitrag zur Theorie der Kondensatorapparate, zur Erzeugung hoher Gleichspannung für Röntgenzwecke), M. Jona. Zeit. für technische Physik, vol. 5, no. 9, 1924, pp. 405-412, 8 figs. Describes new method to explain and calculate drop in potential always occurring in condenser apparatus, and proves theory by experiment.

Crystal-Structure Analysis. The Analysis of Crystal Structure By X-Rays, W. H. Bragg. Engineering, vol. 138, nos. 3062 and 3064, Sept. 5 and 19, 1924, pp. 349-350 and 428-430, 8 figs. Considers new methods of analyzing structure of materials by means of X-rays, considering especially stages by which they move toward their objective. Abstract of paper before Mathematical and Physical Science Sec. of Brit. Assn.

See also CRYSTALS, X-Ray Analysis; STEEL, Crystal Structure, X-Ray Analysis.

Developments. Recent Advances in X-Ray Technique, M. A. Codd. Elec. Rev., vol. 94, no. 2420, Apr. 11, 1924, pp. 566-569, 7 figs. Outstanding features of coil which render it pre-eminent as a producer of X-rays; use of transformer rectifier sets; tubes; measurement of X-rays; etc.

Intensity Measurement. See LIGHT, Fluorescent.

J-Phenomenon. Some Recent Researches on X-Rays: the J-Phenomenon, C. G. Barkla. Nature (Lond.), vol. 114, no. 2873, Nov. 22, 1924, pp. 753-755. Characteristics of J-phenomenon; experimental evidence; applications to scattering of X-rays. (Abstract.) Sylvanus Thompson lecture delivered before Röntgen Soc.

Medical Apparatus. Advances Made in X-Ray Apparatus (Elektromedizinische und röntgentechnische Fortschritte im letzten Jahrzehnt), Geo. Heber. Elektrotechnik u. Maschinenbau, vol. 42, nos. 10 and 11, Mar. 9 and 16, 1924, pp. 145-150 and 160-169, 16 figs. Advances made in last 10 years in design of X-ray tube; cold cathode tubes with effective water cooling for Roentgen therapy, designed to carry as much as 2.5 milliamperes at 200 kv. for several hours; hot cathode tubes with two heating filaments suitable for 20 and 100 milliamperes respectively, former for treatment, latter for short exposures; changes in design of mechanical interrupters for high-power spark coils.

Experiments with a Modern Plant for X-Ray Therapy (Alcune prove su di un moderno impianto per roentgenterapia), E. Pugno-Vanoni. Elettrotecnica, vol. 11, no. 22, Aug. 5, 1924, pp. 528-535, 15 figs. Description of apparatus with diagram, and photographs of different parts of plant and of spectrograph used; experiments show that addition of thermionic valves as system of rectification is distinct advantage; it suppresses oscillations produced from sparks at contact; it makes working more quiet; and discharge in air is avoided, consequently production of ozone, etc., is greatly reduced.

Metal Examination by. See METALS, X-Ray Examination.

Precision Research Apparatus. An Improved Apparatus for Precision Researches With X-Rays, S. K. Allison and G. L. Clark. Optical Soc. of Am.—Jl., vol. 8, no. 5, May 1924, pp. 681-691, 3 figs. X-ray apparatus which has been in use in laboratory of Wm. Duane at Jefferson Physical Laboratory of Harvard Univ. has been improved so that results may be obtained more accurately and rapidly than before. Describes improved apparatus and mentions some of the technical difficulties which have arisen and been solved, in hope that other workers in the field of X-rays may be benefited.

Scattering. The Scattering of X-Rays, A. H. Compton. Franklin Inst.—Jl., vol. 199, no. 1, July 1924, pp. 57-72, 5 figs. Deals with theories of scattering of X-rays, spectroscopic examination of scattered rays from light elements, intensity of scattered X-rays, etc.

The Scattering of X-Rays, Wm. Bragg. Engineering, vol. 117, no. 3033, Feb. 15, 1924, pp. 204-205, 4 figs. Deals with controversy between corpuscular and undulatory theories of light. (Abstract.) Address before Roy. Instn.

Soft. Soft Röntgen Rays (Ueber weiche Röntgenstrahlen), P. Lukirsky. Zeit. für Physik, vol. 22, no. 6, Apr. 4, 1924, pp. 351-367, 10 figs. The threshold values for X-radiations from carbon and aluminum were determined by measuring total

secondary emission and velocities of secondary electrons.

Soft X-Rays From Tungsten, C. B. Bazzoni and C. T. Chu. Franklin Inst.—Jl., vol. 197, no. 2, Feb. 1924, pp. 183-197, 7 figs. General theory and experimental procedure.

Steel Castings, Examination by. See STEEL CASTINGS, X-Ray Examination.

Steel, Examination by. See STEEL, X-Ray Examination.

Versatility. The Versatility of X-Rays, Geo. L. Clark. Tech. Eng. News, vol. 5, no. 5, Dec. 1924, pp. 174-177, 192 and 194, 1 fig. Direct applications of X-rays; X-rays and crystal structures; X-rays and atomic structure.

Y—Z

YACHTS

Motor. The Diesel Auxiliary Schonner-yacht "Hussar." Shipbldr., vol. 30, no. 161, Jan. 1924, pp. 19-27, 8 figs. Built and engined by Burmeister & Wain, Copenhagen; displacement, 826 tons; power of Diesel auxiliary engine, 900 i.hp.

The Twin-screw Motor Yacht "Princess." Shipbuilder, vol. 31, no. 171, Nov. 1924, pp. 232-240, 5 figs. Particulars of engine built by Furness Shipbldg. Co., Ltd.; length, 198 ft.; beam, 30 ft.; depth, 16 ft.; speed on service, 14 knots; propelling machinery consists of twin 520-b.hp. 2-stroke 4-cylinder Sulzer oil engines.

The Twin-screw Motor Yacht Sea King. Engineer, vol. 137, no. 3558, Mar. 7, 1924, pp. 246-248, 16 figs. partly on supp. plate. and p. 256. Yacht, which is 147 ft. 9 in. long, is equipped with twin Vickers-Petters hot-bulb engines.

Twin-Screw Motor Yacht. Mar. Engr., vol. 47, no. 565, Oct. 1924, pp. 363-366, 4 figs. Describes Vedette, recently completed by Burmeister & Wain, Ltd., Copenhagen, for F. W. Vanderbilt. Length, overall, 158 ft. 6 in., breadth, molded, 33 ft., displacement, 640 tons.

Yacht Construction at the Krupp Germania Shipyard (Der Yachtbau auf der Fried. Krupp Germaniawerft Aktiengesellschaft und der Flussschiffswerft Projensdorf), H. Köppe. Kruppsche Monatshefte, vol. 5, Oct. 1924, pp. 202-208, 8 figs. Design and construction of twin-screw motor yacht "Oceanus"; 600-hp. Diesel engines; speed at trial 12.85 knots.

Radio Equipment. See RADIOTELEGRAPHY, Equipment for Yachts.

ZANTHATE. See FLOTATION, Zanthate.

ZINC

Amalgamated, Corrosion. Effect of Reduced Pressure on Rate of Corrosion of Amalgamated Zinc in Acid and in Alkali Solutions, E. W. Greene and O. P. Water. Am. Electrochem. Soc.—Advance Paper no. 28, for meeting Oct. 2-4, 1924, pp. 435-441. Results of tests.

Corrosion. See CORROSION, Lead and Zinc.

Crystals. See CRYSTALS, Zinc and Cadmium.

Deposits. See ZINC DEPOSITS.

Determination in Ore. Determination of Zinc in Ores by Titration (Dosage du zinc par titrimétrie) E. Beyne. Société Chimique de Belgique —Bul., vol. 3, no. 10, Oct. 1924, pp. 507-516. Discusses various modifications of Schaffner's method of titrating zinc in ammoniacal solution with sodium sulphide, and it is urged that in contracts modification to be used should be precisely specified; to obtain satisfactory results compensatory method is necessary, in which quantities of iron, aluminum and manganese, corresponding with those in ore, are introduced into standard zinc solution.

Electrolytic. Examination of Electrolytic Zinc (Untersuchungen über Elektrolytzink), M. v. Schwarz. Metall u. Erz, vol. 21, no. 21, 1st Nov. no., 1924, pp. 499-504, 11 figs. Details of micrographic investigation of precipitate, its properties and composition, change in volume and resistance during heating and cooling, hardness depending on temperature, etc.

Metallurgy. See ZINC METALLURGY.

Mines. See ZINC MINES.

Ore. See ZINC ORES.

Plating. See ELECTROPLATING, Zinc Plating.

Production, 1923. Zinc in 1923, C. E. Siebenthal and A. Stoll. U. S. Geol. Survey (Mineral Resources of U. S.), no. I:6, Oct. 10, 1924, pp. 79-99. Production; zinc-reduction plants; trade conditions.

Recovery from Scrap. Recovery of Zinc From Galvanized Iron Scrap (Zinkgewinnung aus verzinktem Eisen), D. R. W. Müller. Metall u. Erz., vol. 21, no. 17, Sept. 1, 1924, pp. 404-405. Discusses recovery of zinc in open-hearth furnace in form of zinc oxide.

Recovery in Brass Melting. Zinc Losses in Brass Melting and Their Recovery (Die Zinkverluste beim Messingschmelzen und ihre Zurückgewinnung), D. R. W. Müller. Metall u. Erz, vol. 21, no. 23, 1st Dec. no., 1924, pp. 552-553. Proposes recovery of zinc oxide by managing course of flue gases in such a way that dust particles may settle down.

Specific Heat. See METALS, Specific Heats.

Thermal Expansion. Thermal Expansion of Zinc and Cadmium (Thermische Ausdehnung von Zink und Cadmium), E. Grüneisen and E. Goens. Zeit. für Physik, vol. 29, no. 3-4, 1924, pp. 141-156, 5 figs. Discusses measurement of coefficients of expansion at various temperatures of zinc and cadmium single-crystal bars at between + 100 deg. and — 253 deg. cent.; dependance of coefficient of expansion on temperature.

ZINC ALLOYS

Copper-Zinc. See COPPER ALLOYS, Copper-Zinc.

ZINC DEPOSITS

Canada. Developing Zinc and Lead Deposits in Gaspe Peninsula, J. C. Beidelman. Can. Inst. Min. & Metallurgy—Bul., no. 143, Mar. 1924, pp. 129-147, 8 figs. Ore occurrence and character; development.

Great Britain. See LEAD DEPOSITS, Great Britain.

Tennessee. Mascot, Tenessee Zinc Area, W. A. Nelson. Min. & Metallurgy, vol. 5, no. 214, Oct. 1924, pp. 469-471. Production, general geology and structure; ores and associated minerals; Mascot ore horizon Abstract of A. I. M. E. paper.

Zinc Deposits of East Tennessee, M. H. Secrist. Tenn. Dept. Education, Division Geology—Bul. no. 31, 1924, 165 pp., 41 figs. partly on supp. plates. History, production, geographical and geological distribution, physiography, drainage, stratigraphy, ores and associated minerals; description of districts; chemistry and genesis of ores. Bibliography.

Tri-State District. The World's Greatest Zinc-Mining Field, J. D. Conover. Min. Congress Jl., vol. 10, no. 9, Sept. 1924, pp. 408-411, 3 figs. History of development of area overlapping adjacent corners of Oklahoma, Kansas and Missouri, known as Tri-State district; nature of ores; development of Picher-Miami field; operating conditions; future possibilities.

ZINC METALLURGY

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Electrolytic Zinc from Complex Ores, U. C. Tainton and L. T. Leyson. Am. Inst. Min. & Met. Engrs.—Trans., no. 1301-M, Feb. 1924, 37 pp., 16 figs. Reviews evolution of electrolytic zinc, describing major obstacles that have been encountered and overcome; discusses chief remaining limitations of present-day standard practice; describes high acid process, in which both acid strength and current density are raised to about four times usual figures, and large-scale operation of process.

Electrolytic Zinc Production (Aus der Praxis der elektrolytischen Zinkgewinnung), V. Engelhardt. Zeit. für Elektrochemie, vol. 30, no. 4, Apr. 1924, pp. 157-164, 5 figs. Author's experience. Pure electrolyte said to be first requisite; statement that Anaconda Copper Co. has been using same lead anodes for 3 years is questioned, as anodes would lose too much lead; to avoid strains in deposits cathodes should be uniform and smooth.

Risdon Works of the Electrolytic Zinc Co. of Australasia. Indus. Australian & Min. Standard, vol. 71, no. 1834, Jan. 31, 1924, pp. 162-164, 2 figs. Description of electricity supply plant, mechanical handling at wharf, calcine storage bin, and handling of coal, lime rock, cathode zinc, slab zinc and residues.

Furnaces. See FURNACES, METALLURGICAL, Zinc; FURNACES, ROASTING, Zinc.

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The Webber: A Famous Zinc Mine, T. Marvin. Explosives Engr., vol. 2, no. 10, Oct. 1924, pp. 349-355, 9 figs. Mining methods at Webber mine, situated just north of Picher, Oklahoma.

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26, no. 14, Oct. 30, 1924, p. 14. See also Mineral Age, vol. 9, no. 2, Feb. 1924, pp. 11-12. Notes on Gordon gas-house-liquor process, based upon solubility of zinc oxide, sulphate or carbonate in dilute solutions of ammonia and ammonium carbonate, and precipitation of zinc from this solution as a basic carbonate by driving off free ammonia.

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ZINC WORKS

Materials Handling in. See MATERIALS HANDLING, Zinc Works.

ZONING

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